

A Science Magazine from CTW, the Creators of Sesame Street.

June 1982

321 CONTACT

TM

Inside: The Mysterious Manatee



Wheeee!



These people are zooming along on a giant roller coaster. Coasters have been around for almost 100 years, but now they're bigger and more exciting than ever.

There are coasters that climb hills 12 stories high, then swoop down at tremendous speed. Other coasters take you over water or through dark tunnels. There are even some coasters where you can ride upside down!

If you'd like to read more about these amazing rides, turn to page 28. And don't miss our roller coaster poster on page 20.

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MANATEES

Imagine yourself sitting on a dock along a river in Florida. You're relaxing in the warm sun. Then you glance down into the water at your feet. Staring back at you is something huge that you've never seen before! It has whiskers on its face and looks like a friendly old hound dog.

But this animal is no dog. It has a large, blimp-shaped body with flippers. Its broad, flat tail looks like that of a whale, only smaller. This mysterious creature swims slowly away from you. Finally it dives into the river and disappears.

You have just spotted a rare animal called a manatee (MAN-uh-tee). They are quite a sight to see because they're so large. Manatees may be 12 feet (3.6 m) long and weigh 1,500 pounds (680 kg). Naturally, they are big eaters. They gobble up to 100 pounds (45 kg) of water plants and weeds each day. This hearty appetite makes them useful to the people of Florida. Manatees help clean out rivers and canals by eating the weeds that would other-

wise clog them up.

Manatees often feed on grasses growing near the surface of streams. Their peaceful grazing gives them the nickname "sea cows." Manatees use their divided upper lips to fasten onto plants like pliers. On quiet nights, a manatee can be heard feeding 200 yards (182 m) away.

Manatees are related to whales and dolphins. All three are descended from creatures that lived long ago on land. All of them must come to the surface of the water to breathe. Manatees usually come up for a breath every four or five minutes.

Unlike their ocean-dwelling relatives, manatees never go very far into the open sea. Instead, they often swim from the ocean off the southern coast of the U.S. into inland rivers, canals and lakes. Their ability to live in fresh water as well as salt water is rare in the animal world.

Manatees like warm water. In Florida, they can often be found near electric generating plants.

Left: Manatees may look frightening, but they are really very gentle animals.

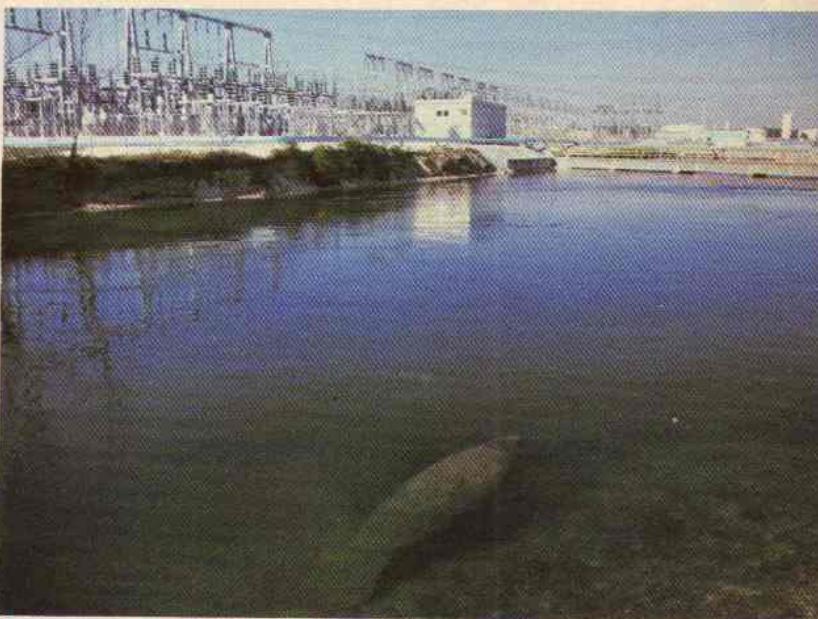
Right: Like whales and dolphins, manatees must come to the surface to breathe.

There, the hot water used in making electricity is dumped directly into the ocean. And at this time of the year when the sea warms up, some manatees will move up the Atlantic coast to North Carolina. Others will swim along the Gulf of Mexico as far west as Texas.

Despite their odd looks, most people like manatees. They are very graceful swimmers. Manatees are also fun to watch when they play. Sometimes they romp together in what looks like games of tag or follow-the-leader.

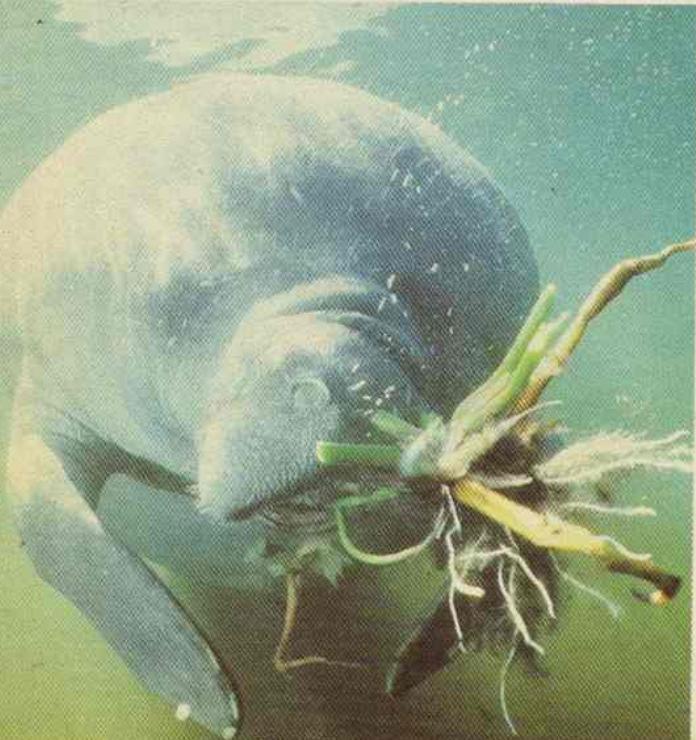
Family Life

Manatees have strong family groups. Male and female pairs often stay together for life. When their calf is born, the mother swims beneath to raise it to the surface for its first breath. By the time the little one is 30 minutes old, the mother is teaching it to swim. She nurses her baby and cradles it in her flippers. For over a year, she stays close to the



GENTLE GIANTS OF THE SEA

by Richard Thiel



Above: Manatees love to swim in the warm water near Florida's electric power generating plants.

Left: Manatees are called "sea cows" because they graze on water plants the way cows do on grass.

young manatee to protect it.

Manatees are one of the most gentle kinds of creatures on earth. They never fight. Even when a baby is in danger, a manatee mother will not attack to defend her calf. Instead, she puts herself between her child and whatever is threatening it.

It is lucky that the manatees have no natural enemies. They are nearly defenseless. Their weak flippers serve only to walk along the sea floor while grazing, and to put food in their mouths. Manatees do have teeth. But they're used only for chewing soft food, not for defense. And as for eyesight, the manatee can't see past its own flippers.

The lives of manatees are not as peaceful as they may sound. These animals are in danger of dying ➡

out. Like whales, they once were hunted for their meat and oil. Finally, laws were passed to protect them from hunters. But today there are only about 1,000 manatees left.

A New Threat

Now the greatest threat is people driving motor boats. Manatees often float just beneath the water's surface. Their dark color hides them from view. When a speeding boat comes along, they can't swim fast enough to get out of the way. The boat crashes into the helpless creature. Almost all adult manatees carry deep scars across their backs from such accidents.

For now, the best hope for manatee safety is boat speed limits for areas where these animals gather. Many signs along Florida waterways warn boaters to slow down. Other places where manatees raise their families are now completely off limits to boaters, divers and even swimmers.

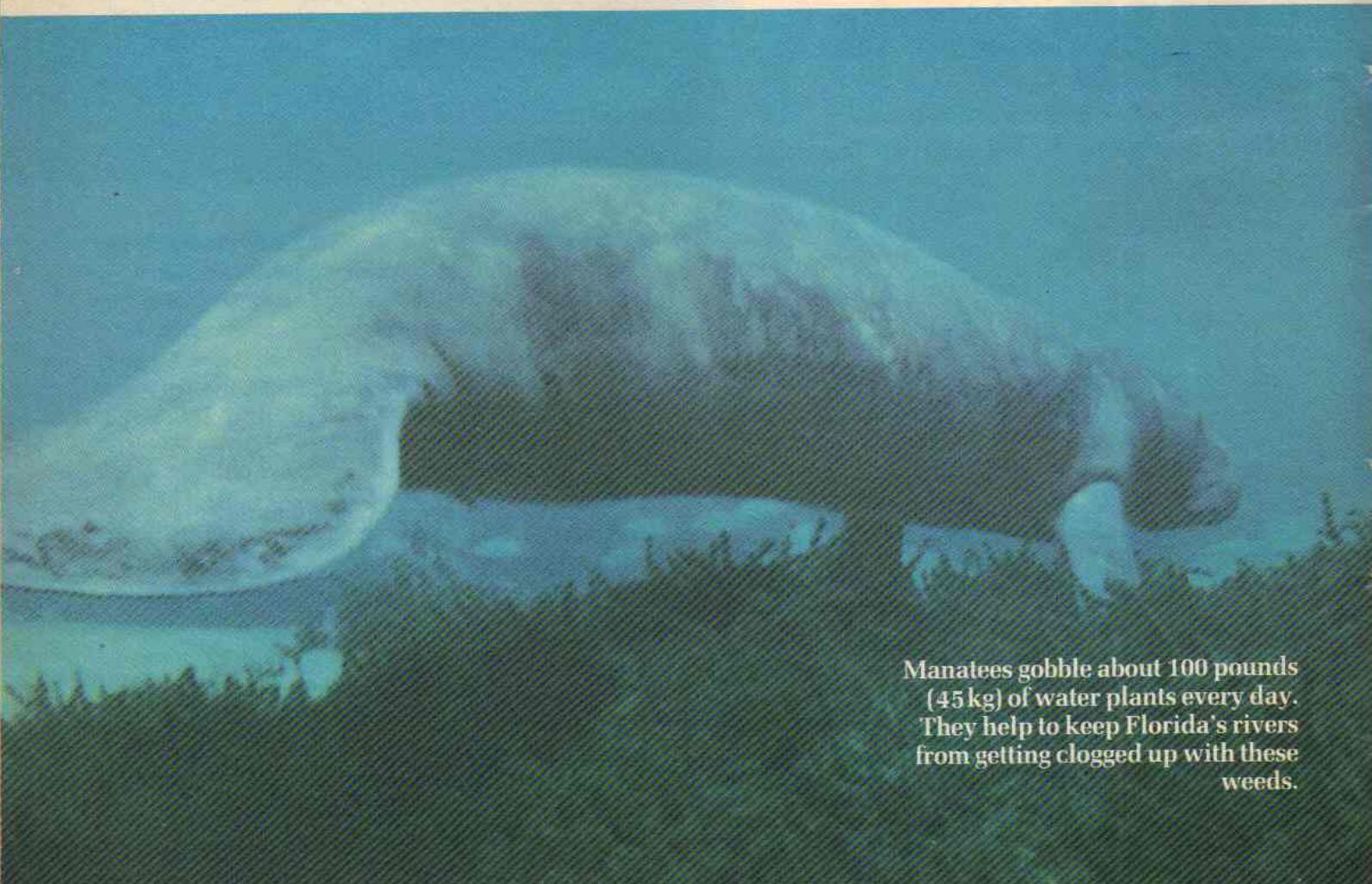
Government researchers are also working very hard to help these endangered animals. Last year they studied 114 dead manatees to find out how

Right: Signs like this one warn people in speed boats to slow down so they won't harm manatees.

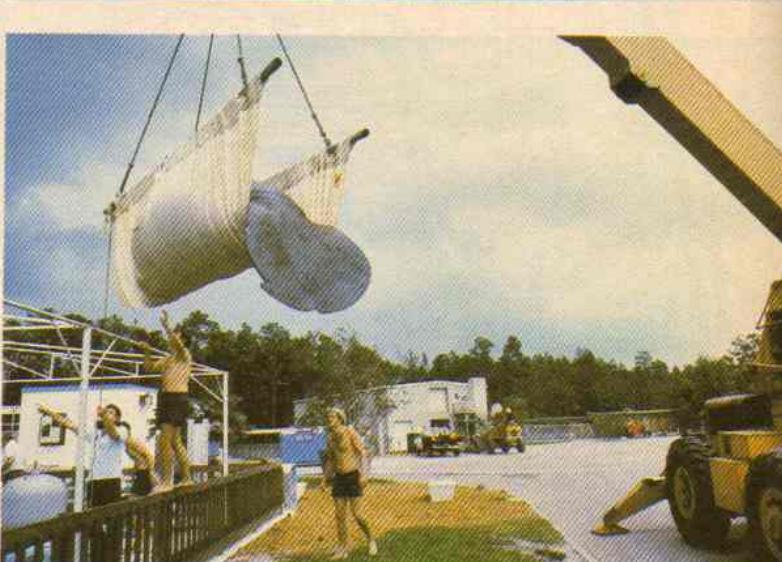
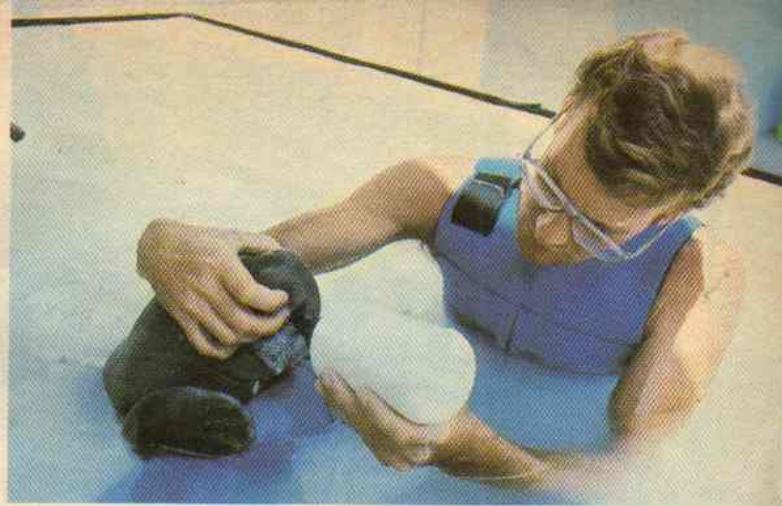
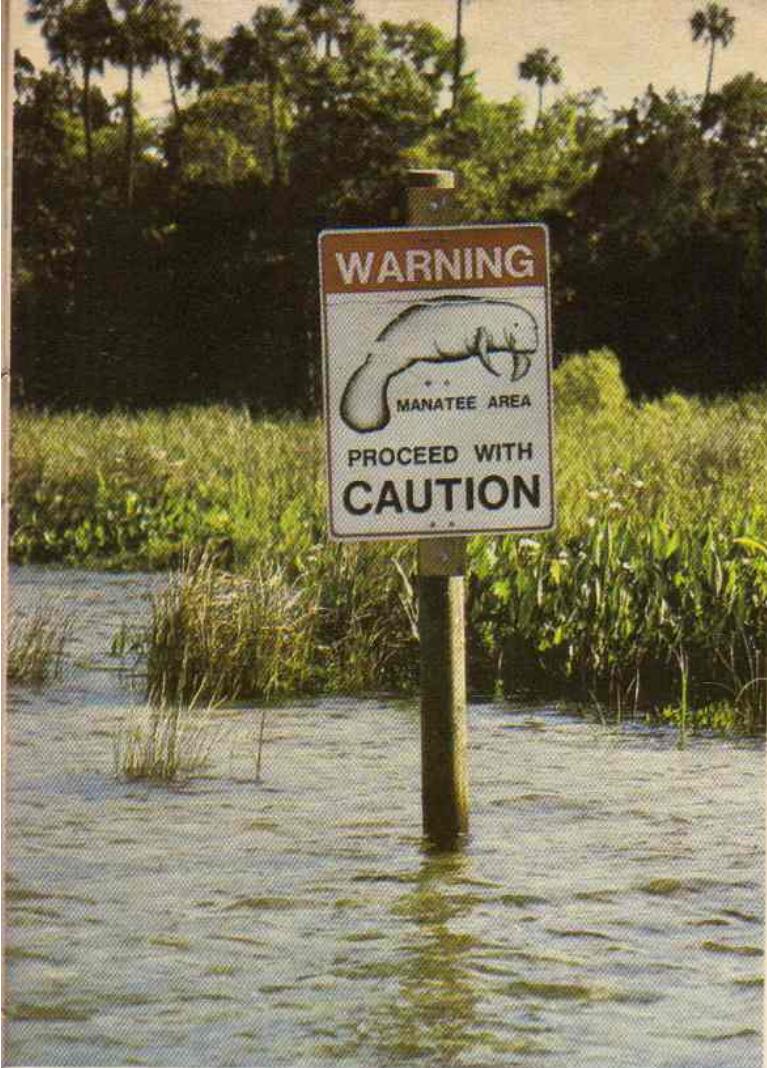
they died. "Twenty three were killed by boats or barges," says Jean Smith of the Marine Research Lab. "That was a 77 percent increase in boat accidents over four years ago."

Researchers think 66 others may have died from extremely cold weather. Manatees are very sensitive to the cold. They may die if the water temperature drops below 70°F (21°C). Between cold weather and boat accidents, manatees are dying faster than they can reproduce.

In the world of nature, people have been manatee's only enemies. Luckily now, many people are also working hard to keep them from dying out. Adults and kids are forming nature clubs to spread the word that manatees are in trouble. Scientists are studying these animals in the hope that they can find ways of helping manatees survive. "We're holding our breath," says Jean Smith. "We hope they can make it."



Manatees gobble about 100 pounds (45 kg) of water plants every day. They help to keep Florida's rivers from getting clogged up with these weeds.



Above (top): People at Sea World rescued this baby manatee and are raising it themselves.

Above: Sometimes people rescue wounded manatees and take them to have their cuts stitched up.

Steller's Sea Cow

What happened to Steller's sea cow over 200 years ago shows what could happen to manatees today. These sea cows, like their cousins the manatees, grazed peacefully on water plants. But unlike manatees which live in warm waters, Steller's sea cows lived in the chilly ocean off Alaska. To survive there, they had extra thick skins. It was their skin that led to their downfall.

People first sighted these sea cows in 1741. A group of explorers was stranded for the winter on an island near Alaska. With them was a scientist named Steller. He studied the animals. The most interesting thing about

them was their skin, he found. It was "one inch (2.5 cm) thick and nearly as firm as a wooden shoe."

Soon this amazing skin was in great demand. Seal hunters in the far north used it to cover the hulls of their boats. Using the sea cow skin made the boats lighter and faster than they were with the wooden covering used before. The skin also was fire resistant. Another popular use for sea cow skin was to make shoes.

The hunters killed many Steller's sea cows. By 1768 there were none left. Only 27 years after people first discovered these animals, they had disappeared forever.

Factoids



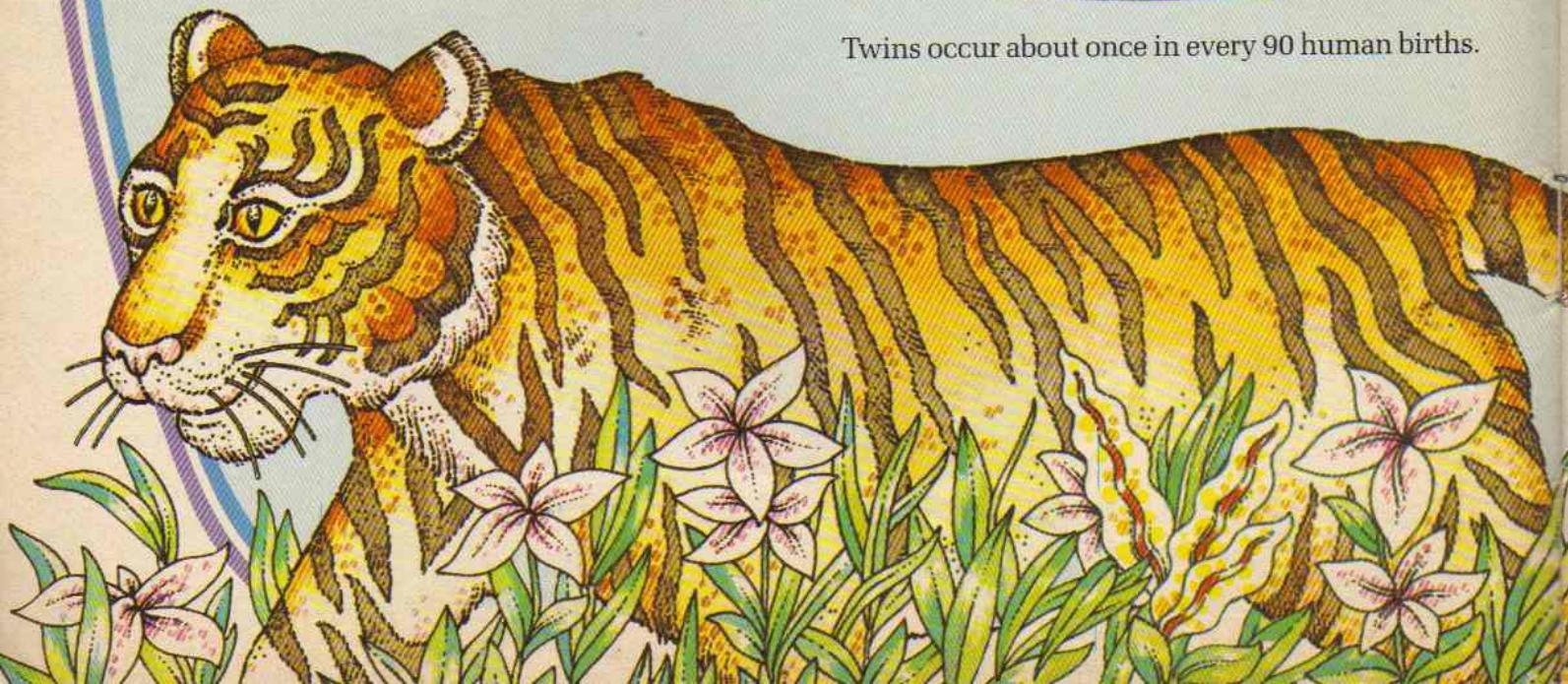
The last time the Liberty Bell was rung was on George Washington's birthday in 1846.

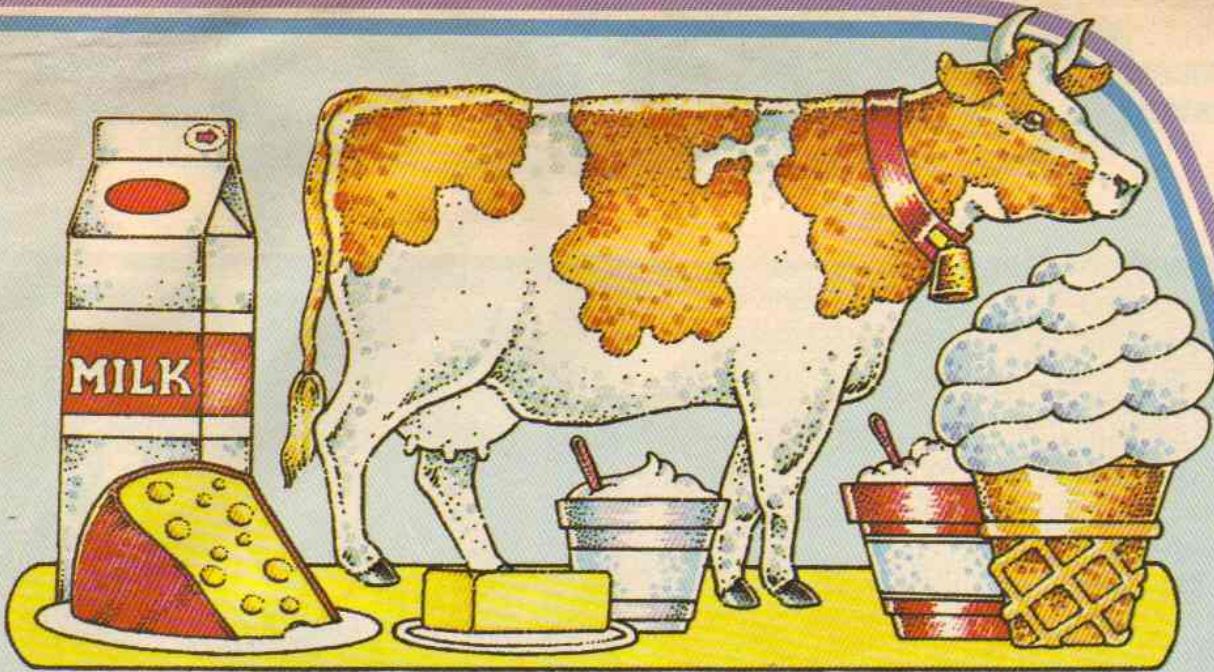


The Great Meteor Crater of Arizona is a mile wide and 60 stories deep.

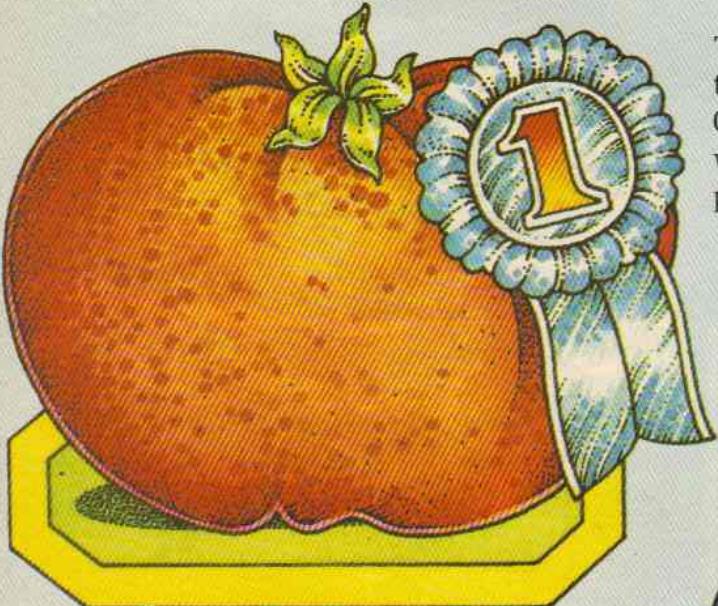


Twins occur about once in every 90 human births.

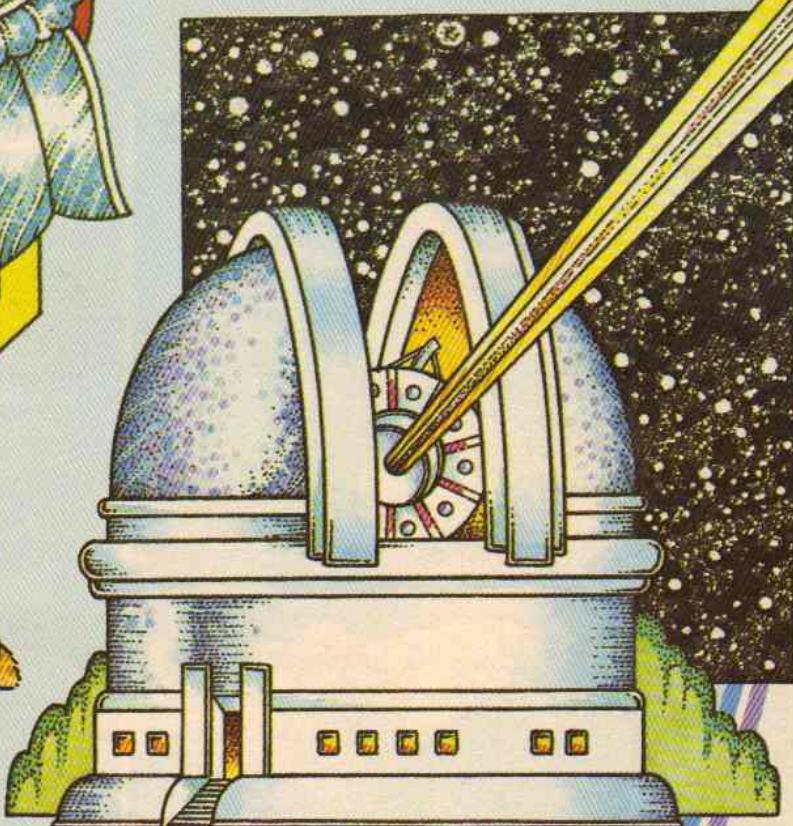




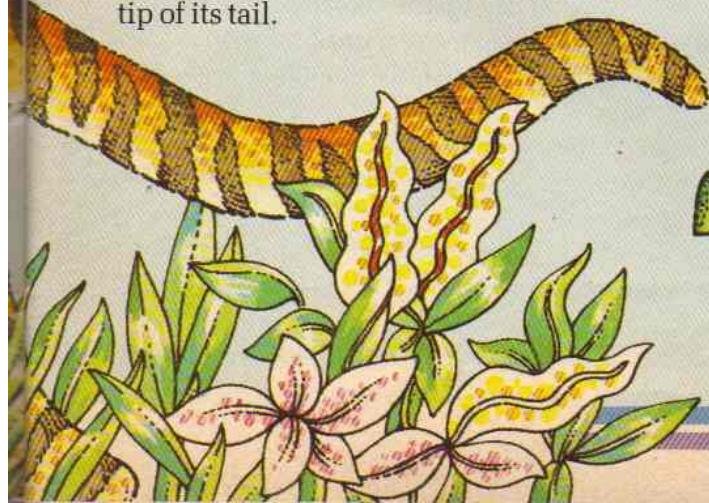
The average American eats and drinks about 560 pounds of dairy products a year.



The world's biggest tomato, grown by Clarence Dailey, weighed six and a half pounds.



The largest member of the cat family is the Siberian tiger, which measures about 10 feet from its nose to the tip of its tail.



The Palomar telescope in California can track a star-like object 60 sextillion miles away.

Contact Report

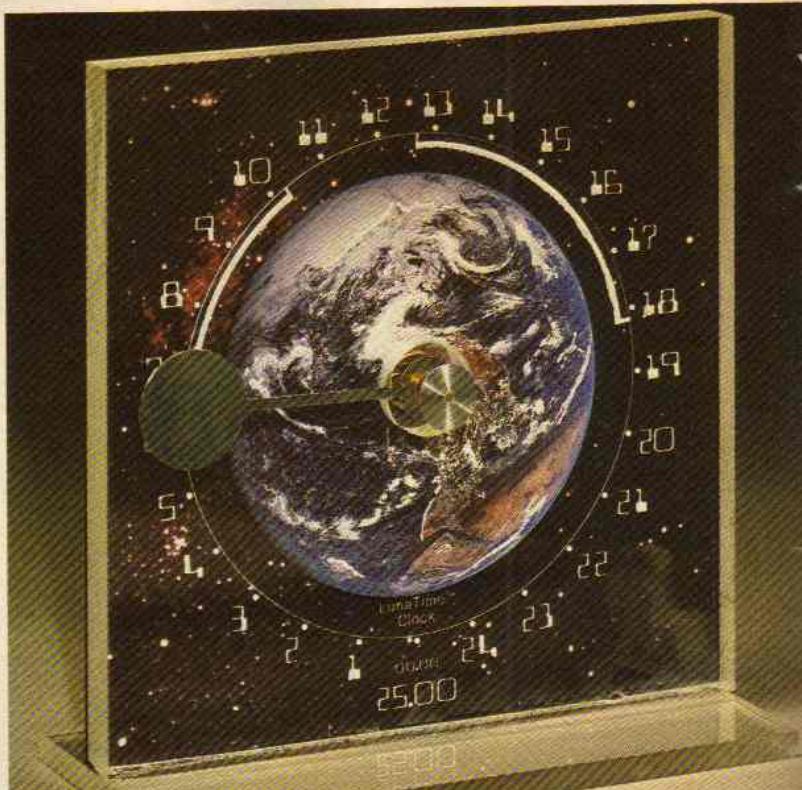
In Tune with the Moon All clocks work on a 24-hour day, don't they? Not any more. Now there is a new clock, called *LunaTime*. Regular clocks use the sun to keep track of the time. But this new clock relies on the moon.

The moon or lunar clock has one hand. It goes around the clock once every 24 hours, 50½ minutes. That's the same amount of time as the moon seems to take to go around the sky.

A lunar clock isn't particularly handy if you are trying to catch a school bus in the morning. But it can do a few interesting things. It shows you when the moon is rising or setting. With a little extra figuring, you could also tell the phases of the moon. And since ocean tides are controlled partly by the moon, a lunar clock could help you keep track of them, too.

But at \$49.95, *LunaTime* may cost you more than you want to spend just to follow the moon. So for now, you might do it the old-fashioned way. You can find the time of the moon and tides in your daily paper.

—Written by Joanna Foley



The new 25-hour moon clock has only one hand.

Food for Thought You probably think that the more calories you eat, the more you will weigh. But some new scientific studies are showing that gaining weight is not as simple as that.

In one study, it was discovered that eating one large meal seems to make people gain weight more than eating several smaller meals. This is true even if you consume the same total number of calories. After a large meal your body produces a chemical which causes much of the food to be stored as fat. Much less of this chemical is made during several small meals, so you use up the calories more easily.

Even the time you eat may be important. In a second study, people were fed a 2,000-calorie meal in the morning. These people lost weight. Later on, they began eating the same meal once a day in the evening. Some people lost weight more slowly. Others even began to gain weight.

What does all this mean to you? Of course it's important to eat the right foods. But it may be important to eat the right amount at the right time, too!

—Written by Joanna Foley

When you eat may be as important as what you eat.

Contact Report

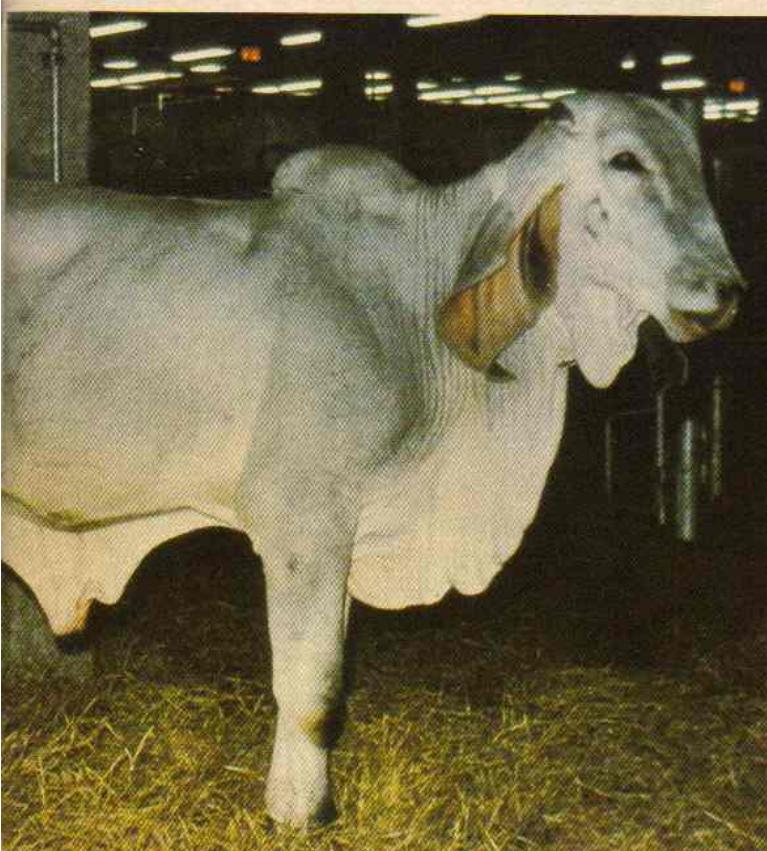
Dye Dye Dirdie? Every year some animals die out and become extinct. But now an animal that people thought was extinct might be alive after all. It's called the golden-fronted gardener bowerbird.

There are many different kinds of bowerbirds in the world. But the golden-fronted one had not been seen by anyone in this century—until last summer. That's when scientist Jared Diamond saw one. It was the first time anyone had seen one of these rare birds in 85 years.

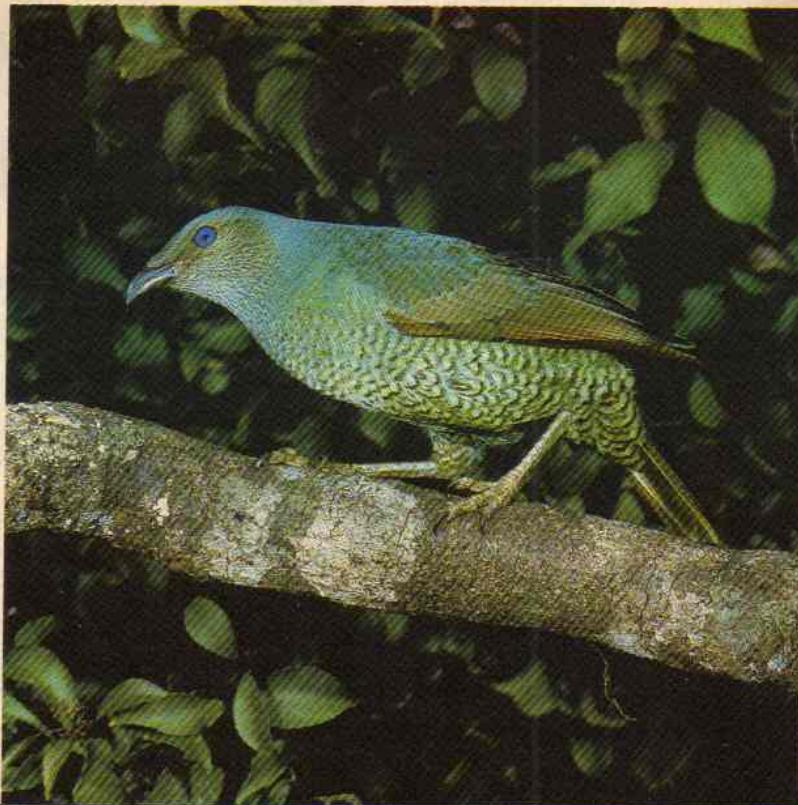
Diamond also spotted the fancy shelter the bird builds, called a bower. The four-foot structure is a big bird's nest. It's made from twigs and leaves. The male bowerbird decorates it with seashells and bits of fruit to attract a female.

Diamond took pictures of the bowerbirds he saw. But his film was lost in a boating accident on the way home. So this summer he plans to go back to take more pictures. People who have waited 85 years to see these birds will just have to wait a little longer.

—Written by Judy Casulli



This strange-looking cow from India is called a zebu.



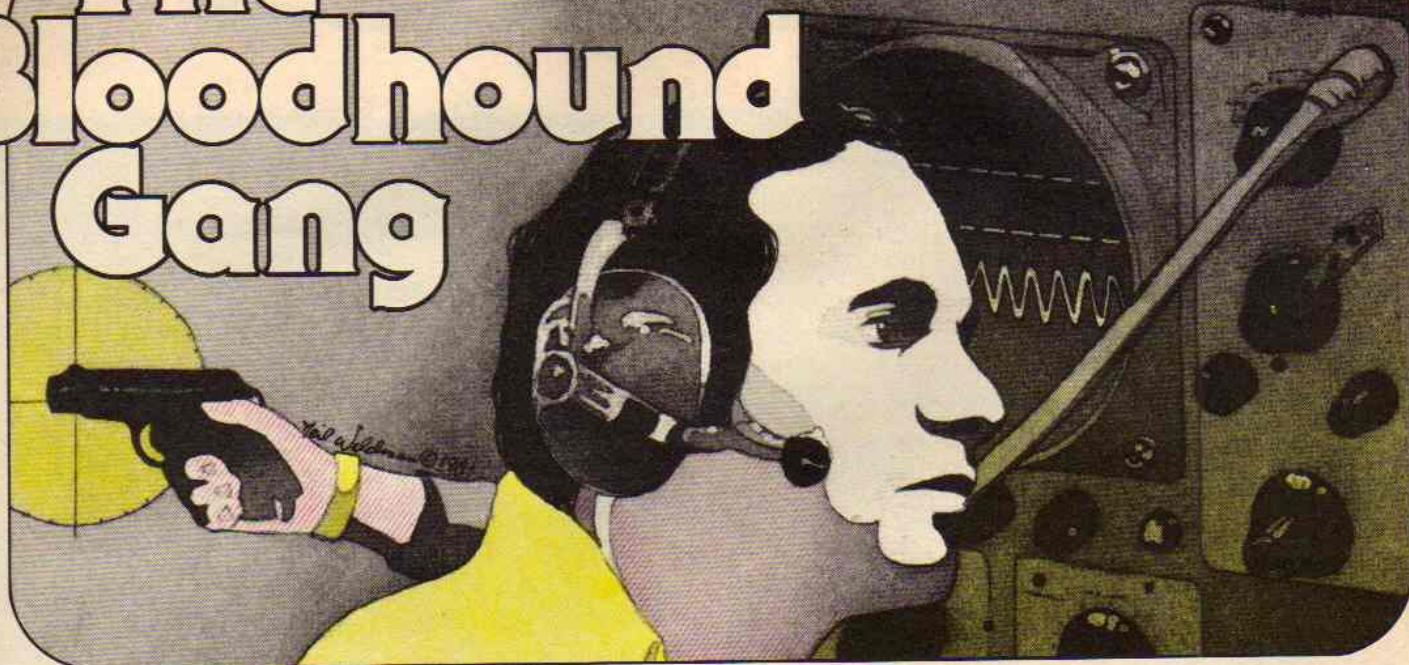
A relative of this bowerbird may not be extinct.

Holy Cow! A zebu is a strange animal with droopy ears and a huge hump between its shoulders. You might think it looks a little funny. But this kind of Asian cow is a strong, hardy animal. Female zebras give a rich supply of milk. All zebras adapt easily to hot, humid weather. They also resist ticks, which harm many other kinds of cattle.

For all these reasons, zebras are coming to the United States. People in the livestock industry plan to mate the zebu with American cattle. In this way, they hope to produce a healthier, stronger breed of cattle. No kidding! —Written by Rosette Reiss

What's That? Did you read about some kid who invented an electric nosewarmer? Or one who set some new science record? Then cut out the newspaper or magazine story and send it to us. If we use your story, we'll send you a CONTACT T-shirt. Be sure to include your name, age, address and T-shirt size. You must include the name of the newspaper or magazine. Write to: **The Contact Report**
P.O. Box 599
Ridgefield, NJ 07657

The Bloodhound Gang



The Case of the Whispering Pirate

Part Three

Vikki, Ricardo and Zack, otherwise known as the Bloodhound Gang, seemed to have walked into more trouble than they'd bargained for. Just a short time ago, their friend Tom Kellogg had been explaining the workings of a sound studio. Now they were all standing up against the wall, afraid to make a sound. Two armed men had burst into the control room and were holding them captive.

"What do you want with us?" Ricardo asked one of the armed men, after a minute or so had passed. "If this is a robbery, just say so. Nobody wants to be a hero. Tell us what you want and let's get it over with."

Just then, Louis, one of the studio's four engineers, walked into the control room.

"Hey, what are you guys doing here?" he yelled at the armed intruders. "I didn't call for you!"

"Cool it! The chief sent us," one of the men shouted back.

Tom turned around to look at his engineer. "I can't believe it's you," he said. "I knew it had to be somebody who worked here, but somehow I'd hoped it wouldn't be you."

"It's not me," Louis said firmly. Then he turned

to the intruders. "You're holding the wrong people," he told them. "Tom's absolutely clean—I'll vouch for that. And his three friends are detectives—Vikki, Ricardo and Zack...."

"Otherwise known as the Bloodhound Gang?" asked one of the armed men.

"The very same," said Vikki, as she slowly turned to face Louis and the other men.

"Tom, listen, I think I'd better explain about all this," Louis began. "And I think I'll start by asking my uninvited friends to identify themselves. Gentlemen?"

"I'm detective Frank Michel," said one of the men.

"Detective Alan Kelin," said the other.

"And I'm detective Louis Berlin," added Louis. "We're undercover cops from the 20th Precinct."

"I'm glad you're the cops and not the robbers," said Tom. "But I don't understand what's going on."

"Because of all the pirating in the record business, guys like me have been staking out studios around the city," explained Detective Berlin.

"That's strange," Ricardo broke in. "When we questioned you, Louis, you said you'd been working here for six months. That means you were

hired two months before the first tape—the Sound Waves—was actually pirated."

"Very observant," said Louis. "See, we figured that this studio would be a likely target for the pirates, so we decided to set up operations here. For better or for worse, our hunch paid off."

The Police Are Baffled

"Does that mean you know who the pirate is?" Tom asked hopefully.

"I'm afraid I don't," said Louis. "And obviously my colleagues don't either, since they were about to try and arrest the four of you."

"An unfortunate mistake," said Detective Michel. "We're really sorry. But it all came about because of an arrest we made a half hour ago."

"That's right," Detective Kelin confirmed. "We picked up a guy named Benson who runs a record-pressing plant. He's the one who actually makes the illegal albums out of the pirated tapes. When we picked him up he was carrying a master of songs by a group called The Bluebeards. And," Kelin continued, "the tape was recorded at this studio."

"Is that the tape that was stolen today?" asked Ricardo.

"That's the one, all right," replied Tom. "But this guy Benson couldn't have done it. The Bloodhound Gang has rightly come to the conclusion that the pirating is an inside job."

"So it is," Louis agreed. "It seems that Benson has inside help all over the place. He recruits engineers by offering big bucks for master tapes."

"Well, I think it's time we discovered who his helper at this studio is," Zack told the others.

"Hey, that's right," said Vikki. "Before Detectives Kelin and Michel burst in here, you were saying that you'd already eliminated one suspect and that you knew how to eliminate two more."

"Yup!" said Zack. "I think I do. First of all, we now know that Detective Berlin isn't the pirate. So, that leaves three suspects. And we also know Stacy isn't the pirate. So, that leaves us with two—Mathew and David."

"Wait a minute!" said Ricardo. "I'll give you Detective Berlin. But how do we know Stacy's okay?"

"Sound waves," Zack said with a smile. "She hasn't got the right sound waves to be the pirate."

"What are you getting at?" asked Detective Berlin.

Zack explained about how they had accidentally taped the pirate's voice. Then he asked Tom to play the tape and freeze the sound waves that appeared on the oscilloscope.

"Observe," he said. "Notice the amplitude of each wave."

"Oh, stop showing off, Zack," said Vikki. "Detectives Michel and Kelin might not know what you're talking about."

"Sorry," said Zack. "Amplitude means height and, as you can see, the waves on the oscilloscope are not very tall. That's because the pirate was either standing far away from the microphone or speaking very softly."

"In this case, the pirate was whispering," Ricardo put in.

"So? The girl could have been whispering," said Detective Michel. "Why rule her out?"

Closing In On the Pirate

"Because the sound waves of a high-pitched, female voice would not look like the waves on the oscilloscope," Zack explained. "A high-pitched voice would create waves that look bunched together. These waves are more spread apart. That means they belong to a lower-pitched voice."

"Meaning, of course, that they belong to Mathew or David," Vikki put in.

"Now you're on the right wavelength," chuckled Zack.

"Amazing!" exclaimed Tom.

"You ain't seen nothing yet," Zack said proudly. "This oscilloscope's going to tell us more than it's told us already. It's going to give us the pirate's name."

"How's it going to do that?" asked Detective Berlin.

"I've got a plan," Zack said. And, with that, he began to fill everyone in.

An hour later, Ricardo and Zack were sitting at the control board. They were watching a second oscilloscope that was now set up beside the first. Louis Berlin was sitting next to them. Detectives Michel and Kelin had stationed themselves outside the front and rear doors of Sound Appeal Studios. Meanwhile, Vikki, Tom Kellogg, David and Mathew were standing inside the studio.

"This will only take a minute," Tom said to David and Mathew. "It's a commercial for a new kind of flashlight. Unfortunately, we couldn't get

actors on such short notice. Luckily, between the two of you, and my friend Vikki, over here, we should be able to work it out."

"Sure, no problem," said the two engineers.

"Okay then," Tom said, starting for the door. "After Vikki reads her lines, you whisper your part into the microphone, David. Then we'll repeat the same thing with you reading the lines, Mathew. Later, we can choose the voice that works best for the commercial. And don't forget to whisper. Remember, it's 2 A.M.; you've just come home and you don't want to wake anyone up."

Tom went back to the control room and started the tape recorder. Then he signalled Vikki to begin.

"It's so dark in here, I can't see a thing," she whispered into the mike.

"Drat . . . the key. It's got to be here somewhere!" first David and then Mathew whispered back.

"Ah! I see it," the girl said softly. "We're sure lucky we had our Lifeline flashlight with us!"

"Perfect!" said Tom, as he stopped the tape recorder. "You two saved the day."

"No sweat," replied David, as he and Mathew walked out of the studio and into the corridor.

The Pirate Is Trapped

"I thought David looked a bit nervous," said Vikki, as she rejoined the others in the control room.

"That's funny," said Ricardo. "I thought Mathew was the one who looked nervous."

"Well, why take guesses when we have the answer in our hands," said Zack.

"I agree," said Tom. "The first set of tapes is ready to roll. Oscilloscope number one will show David's voice as he whispers the same words."

Everyone watched the two oscilloscopes. They played David's voice over and over again. Then they set up the other tape and did the same with Mathew's voice. When it was all over, everyone was pretty sure who the culprit was. The amplitude and wavelength of one of the voices seemed to match those of the whispering pirate to a T.

"Just to make sure on these tapes," said Louis, "We'll check out the results again on our voice printer when we get back to the police lab."

"Great!" said Tom.

Then, at the request of the Bloodhound Gang, Detectives Kelin and Michel brought the pirate in.

"Why did you steal the tapes?" Tom asked. "And the booth—why did you have to lock us in that booth?"

"It was the money!" Mathew shouted. "I never wanted to hurt anybody. I just needed the money. The booth was an accident."

"I think he's lying," said Detective Michel.

"I don't," said Vikki. "At least not about the booth. I think in a way it was an accident. My guess is, he walked into the studio without realizing we were in there this afternoon. Then, when he saw us in the soundproof booth, he knew he'd have to do something if he didn't want to be seen. So, he shut off the lights and locked us inside. Then he went after the tape he'd promised Benson. Unfortunately for him, on his way to the cabinet he dropped the key. That's when he lost his cool, and that's when we got his voice on tape."

The three police detectives took the tapes of the whispering pirate as evidence. Then, saying good-bye to Tom and the three younger detectives, they led Mathew away.

"Thank you for everything," Tom said to the Bloodhound Gang. "Now, how about my treating you three to a celebration dinner and to a free, unpirated copy of the Sound Waves' new album?"

"Sounds great!" whispered Vikki, Ricardo and Zack. Then they all began to laugh.

**Next month begins
an exciting new
adventure, starring
the Bloodhound
Gang!**



Summer Bummers

A CONTACT QUIZ

by Michele Lyons

Ice cream and lemonade. Picnics and swimming pools. Summer is coming soon and good times are ahead. Or are they? Thunderstorms, insect bites and poison ivy are some of the things that can spoil your summer fun.

You can prepare for a safe summer. Just take this quiz. As you read the answers, you'll learn how to keep cool when the heat is on.

1. If you sprain your ankle in a baseball game, don't stop playing. Exercise will keep your ankle from swelling up.
True or False?
2. When a bee stings your hand, you should try to swat it as fast as you can.
True or False?
3. Those itchy red bumps are what causes a poison ivy rash to spread.
True or False?
4. If you leave your tuna salad sandwich in the sun too long, eating it might make you sick.
True or False?
5. Once you check your bicycle, you can ride it safely all summer.
True or False?
6. If you are walking in the woods and get lost, it is a good idea to stop walking and sit down.
True or False?
7. Too much tennis on a hot, sunny day can make you faint.
True or False?
8. It is dangerous to swim when storm clouds appear, even if it isn't raining.
True or False?

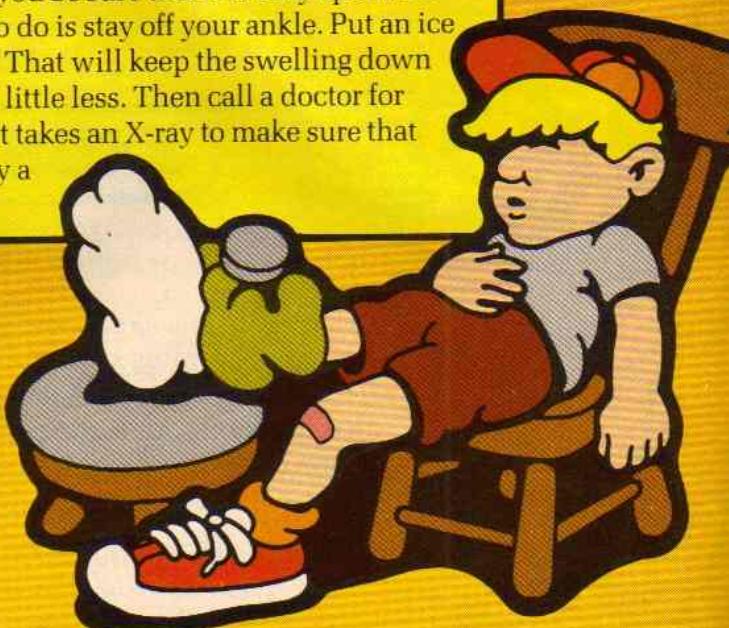
Answers on
the next page.

Quiz Answers

1

False Don't take a step. A sprain means your muscles or ligaments are stretched or torn. Exercise will stretch and tear them even more. Besides, how can you be sure that it is only sprained?

The best thing to do is stay off your ankle. Put an ice pack on your foot. That will keep the swelling down and make it hurt a little less. Then call a doctor for help. Sometimes it takes an X-ray to make sure that a sprain isn't really a broken bone.



2

False When a bee stings you, it leaves its stinger in your skin. Without that stinger, the bee will die. So swatting it is a waste of time. Instead, just be-e-e calm.

If you can see the stinger in your skin, try to remove it with tweezers. Then put some ice on the sting. If you are like most people, your hand will be good as new in a few hours.

For a few people, insect bites and bee stings are a big problem. If a bee sting makes you break out in hives, or have trouble breathing, call a doctor for help right away.

3

False The red, itchy rash of poison ivy isn't catching. But the invisible oil is. Poison ivy oil gets on your hands when you touch the plant. If you don't wash it off right away, the oil sinks into your skin. After a day or two, the rash appears.

Once you wash the rash with soap and water, it should not spread. If your poison ivy keeps spreading, it means you are still touching the oil. It could be on your clothes from that day, or the towel with which you washed your hands. It could even be on your dog if he rolled around in a poison ivy patch! So wash everything you think might have the poison ivy oil on it, just to be safe.

By the way, scratching won't cause poison ivy to spread. But it can cause the skin to break. That can lead to infection. So try not to scratch.

4

True Bacteria can grow on food.

This is especially true in warm weather. To play it safe, keep picnic food in an ice bucket or a cool shady place.

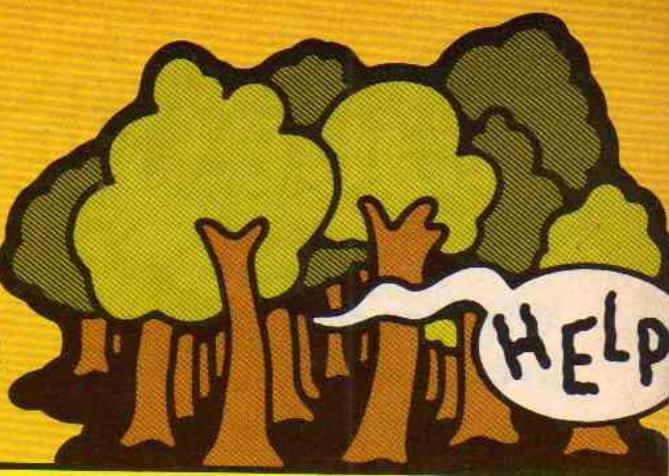
If you do get a bad stomach ache, the best thing to do is drink a lot of water or tea. These plain liquids will help wash the bacteria out of your system. Again, it's important to play it safe. If you really don't feel well, call your doctor for help.



5

False If you ride your bicycle a lot, checking it once at the start of the summer isn't enough. You should check your bike once a week and before you go on any long trip. If your tires are soft, fill them with air. If your bike squeaks, oil it. Are there loose spokes in your wheels? Tighten them. Make sure your brakes work well.

Take a little time to make sure you have a safe set of wheels. It might save you a lot of time and trouble later on.

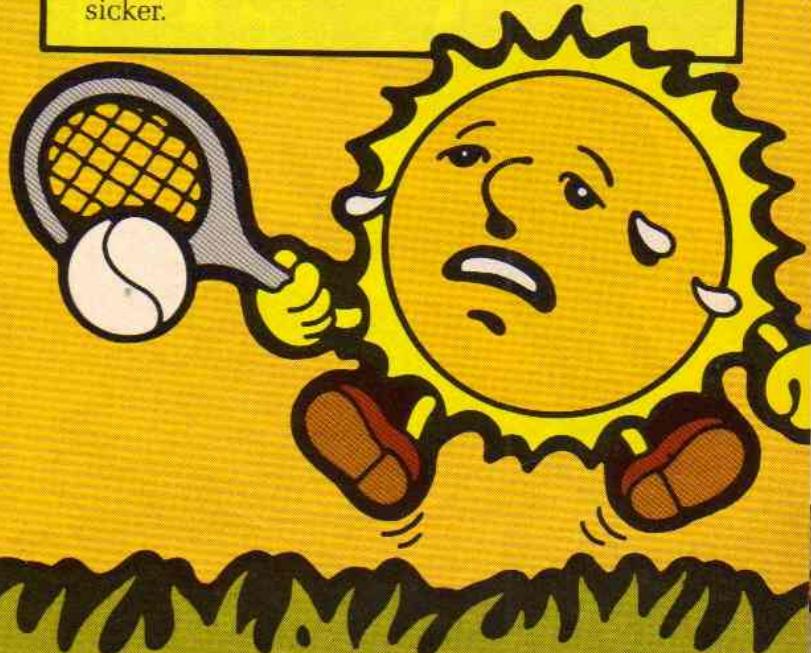
**6**

True There is no one set of advice for a person who is lost in the woods. A lot depends on the situation. Does someone know where you are? Are you expected back soon? Will it get dark soon?

Sometimes sitting down is the best thing you can do. This will give the people who might miss you a chance to find you before you get even more lost. One good idea is to take a loud whistle along when you go hiking. A loud toot or two will tell your friends or family that you're out there and that you need some help.

8**7**

True Too much of anything on a hot day can make you faint. If it's hot outside and you're working up a sweat, your body will lose too much water. That can lead to heat exhaustion. You'll begin to feel weak and dizzy. Then you might even feel like you're about to faint. That's your body's way of telling you to cool it. Rest with your feet up and drink small sips of water until you feel better. If you just keep on playing tennis, you'll lose even more water and get even sicker.



True Get out of the water as soon as you see or hear thunderclouds approaching. The noise of thunder won't hurt you, but the lightning that goes along with it is dangerous. Each flash of light is a very powerful charge of electricity. Electricity travels well in water. If you're in the water when lightning strikes, it might reach you! If there's a house or building near where you are swimming, go inside till the storm blows over.

Any Questions?

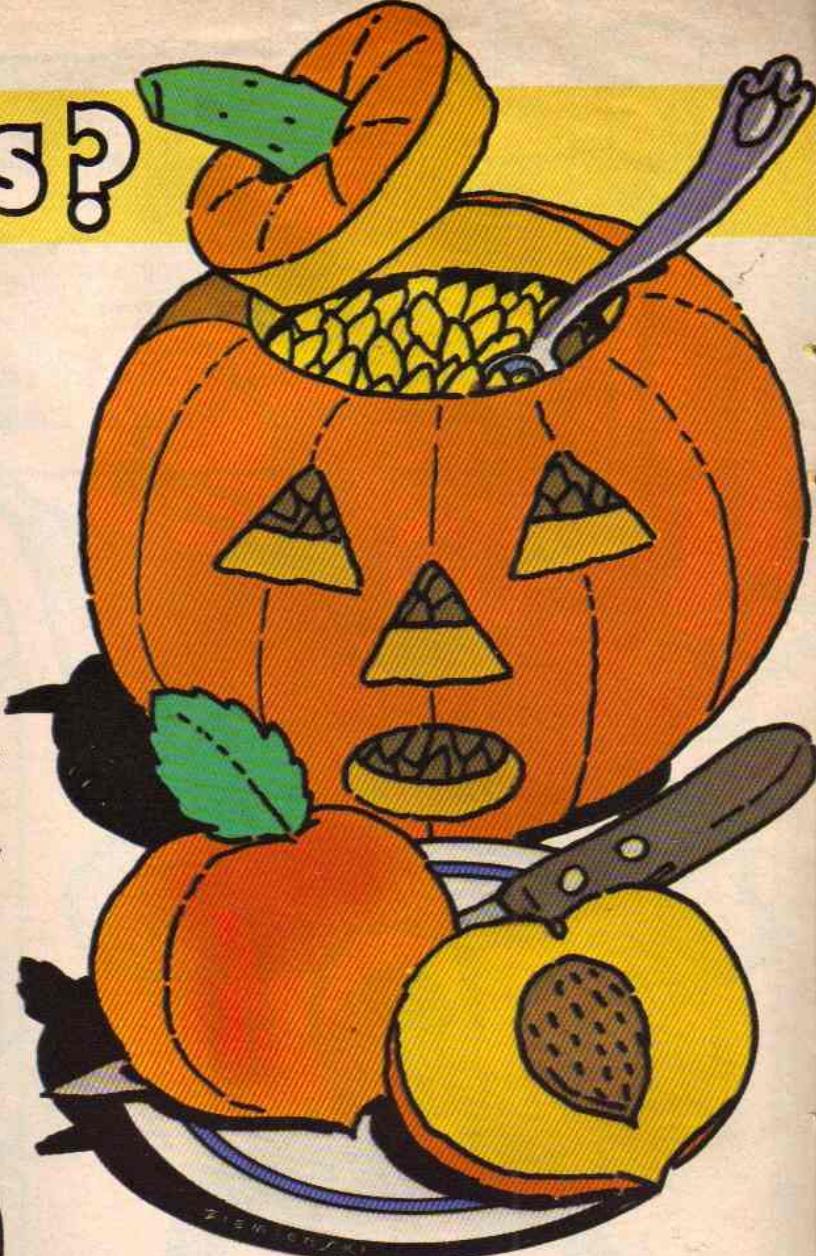
Why are there so many seeds in a pumpkin and only one in a peach?

Peach seeds are big and come one to a peach. Pumpkin seeds are smaller, but are produced by the hundreds. But big or little, many or few, seeds are very important to a plant. Each seed can produce a new little plant just like the plant it came from. Since seeds are so important, all plants produce extra seeds beyond what they need just to survive.

Each plant produces seeds in the way that best helps it survive. A pumpkin plant makes only a few pumpkins, so each pumpkin has many medium size seeds. Animals eat the pumpkins and carry the seeds away. After the seeds pass through the animal's body, they go back to the ground. There they may grow into new plants.

Each peach has only one large seed. But a peach tree has many peaches. So every time an animal eats a peach, it lets the big pit fall to the ground. Any one of these peach pits may grow into a new peach tree.

Question sent in by Lissie Dyer, West Orange, NJ.



Why can you hear your echo in some places and not in others?

No one can see sound. But if you could, an echo would look sort of like a rubber ball bouncing against a wall. An echo happens when sound bounces back from an object.

When you speak or shout, your voice sends out vibrations. These vibrations cause particles of air to move. The movements of these particles of air are called sound waves. When sound waves hit a large, smooth object and bounce back, you sometimes hear the sound a second time. That is the echo.

If you don't hear an echo, it probably means that the sound waves didn't hit the wall in just the right way. It could mean that the wall is not big enough to send back the sound. Or, maybe the sound of your voice was too weak.

If you really want to hear your voice bouncing around, yell into a canyon. A canyon has many surfaces that will bounce sound waves around. If the sound waves bounce from wall to wall, you will hear three or four echoes!

Question sent in by Laurel Romer, Sidney, OH.

Do you have a question that no one seems able to answer? Why not ask us? Send your question, along with your name, address, and age, to:

Any Questions?
3-2-1 CONTACT
P.O. Box 599
Ridgefield, NJ 07657

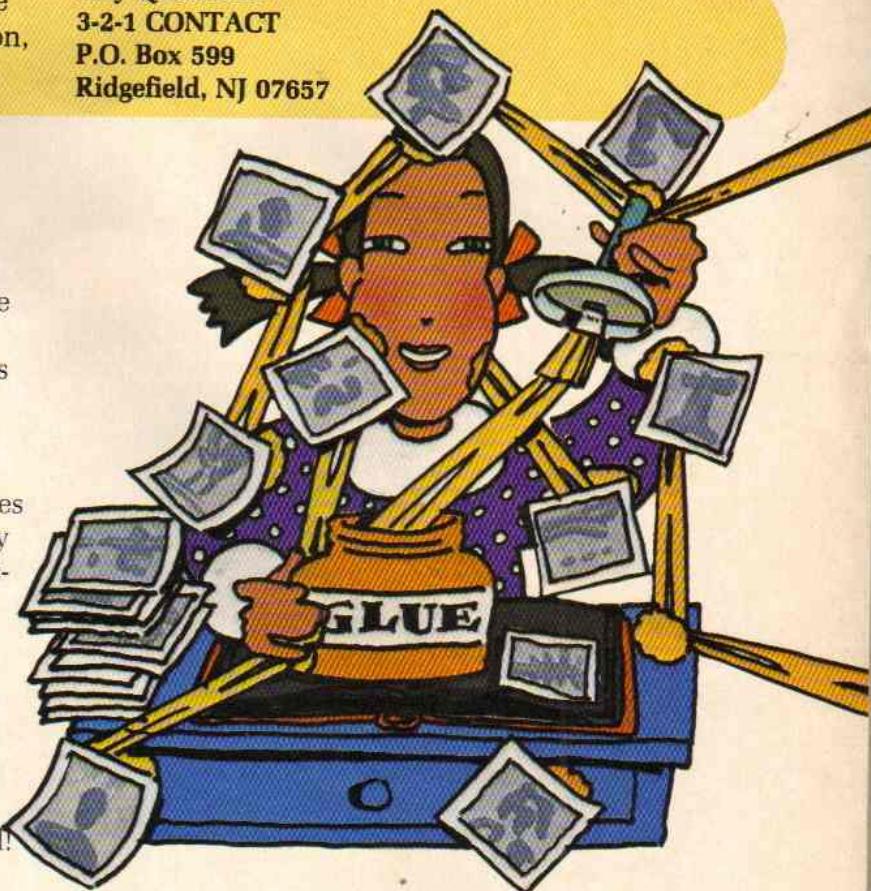
What makes glue stick? Think about it. It's amazing that a liquid like glue makes things stick together. It can work on light things like paper or heavy materials like wood and metal.

Sometimes glue works by leaking into little holes called pores on the surface of a material. Then it dries and gets hard. That makes the two surfaces hold together.

Glue works in other ways, too. Think of two pieces of paper. On the surface of each paper are many tiny particles. And in the glue there are other tiny particles. These little bits of glue attract the particles on each piece of paper. That makes the two pieces of paper stick together.

For glue to work, the two things to be glued must be clean. They also must fit together closely. If they don't, the tiny bits of paper and glue won't stick. Then the glue will shrink away when it dries. And the project you were working on will come unglued!

Question sent in by Albert Michael, Virginia Beach, VA.



Why is there sand in your eyes when you wake up?

The reason there's yucky stuff in your eyes in the morning is because there are tears in your eyes *all the time*. That's right, tears!

Tears have an important job to do. They help keep your eyes wet and clean. They're so important that your eyes go right on making tears even when you sleep. But the nighttime tears are slightly different from the ones you cry when you hurt yourself or feel sad. These night tears contain something called mucus.

When you fall asleep, some of these night tears come together in the corners of your eyes. And since you don't blink your eyelids while sleeping, the tears just sit there. Finally, the mucus they contain begins to collect and dry out. What's left is that crusty, sticky stuff you rub from your eyes the next morning.

Question sent in by Cindy Allman, Chambersburg, PA.



CONTACT

POSTER

ON
NEO

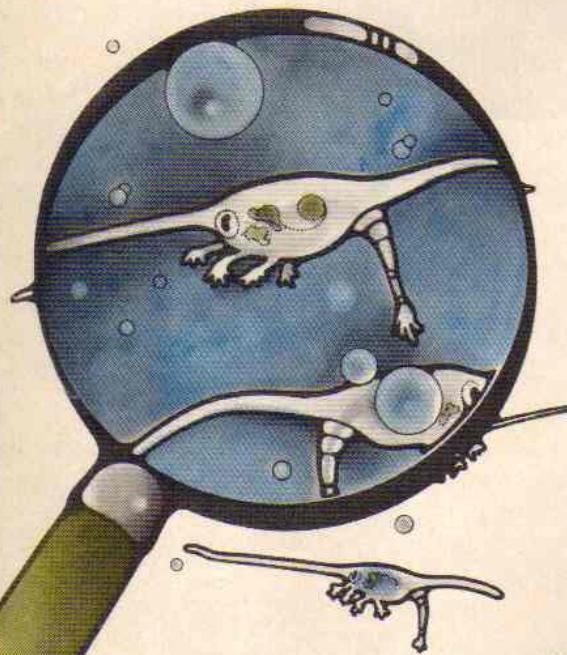


List of the Month

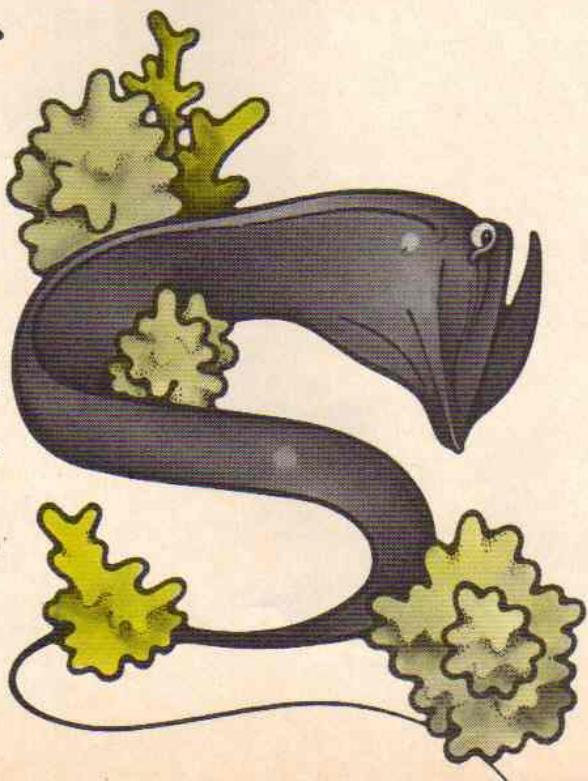
They're All Wet!

by Wendy Williams

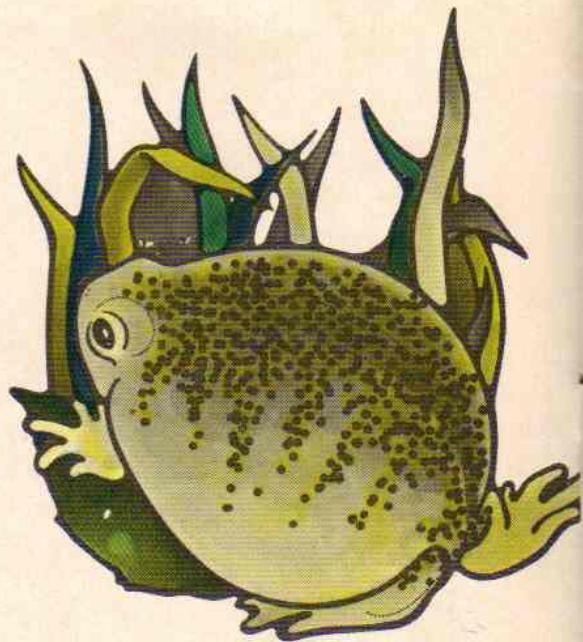
Manatees aren't the only unusual animals that live in the water. Here are a few others.



Big Mouth Living in the darkness, about a mile (1.6 km) below the ocean's surface, is the gulper eel. The gulper's eyes and brain are small, but its mouth is huge. And its stomach can expand to several times its normal size. Like a snake, the gulper can swallow an animal much larger than itself. A gulper can be as small as a few inches or as long as six feet (1.8 m). Its whip-like tail can be four times the length of its body.

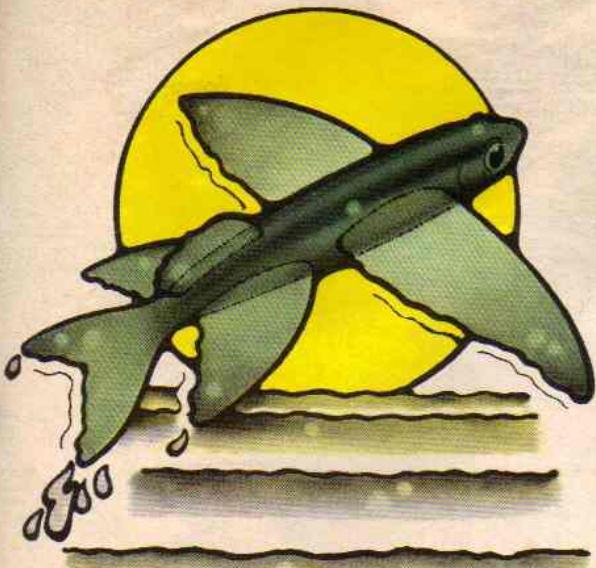


Crabby Baby A new-born crab is called a zoea (ZO-ee-uh). After hatching from its egg, the baby crab rises to the water surface to eat. It feeds on tiny sea plants and animals called algae. Clear as a piece of glass, the zoea doesn't look much like a full-grown crab. But after shedding, or molting, its glassy-looking shell a few times, it begins to look more like a member of the crab family.

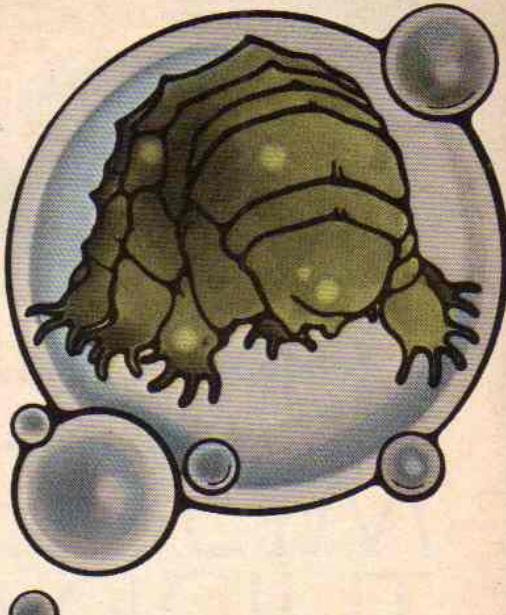


Up, Up and Away! Look, up in the sky! It's a bird! It's a plane! It's... a fish? Yup, it's a flying fish. Actually, this fish doesn't fly like a bird. It uses its tail to push itself out of the water. It can glide for 30 seconds and as far as 1,000 feet (300 m). Sometimes it lands on a passing boat. Why do these fish take to the air? To escape the hungry jaws of dolphins and big fish.

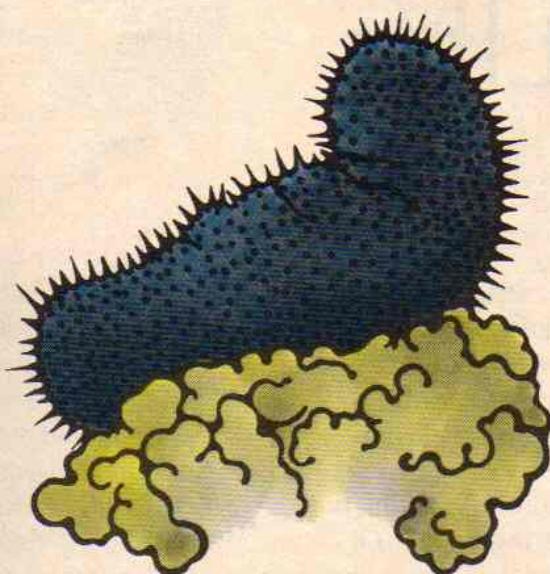
Giant of the Sea Bet you never saw a giant octopus. Some people think they exist. Almost 100 years ago, part of a strange creature washed ashore in Florida. Some people said it could have been an octopus more than 100 feet (30 m) long. Others disagreed. Finally, in 1971, two experts re-examined bits of the creature. Their conclusion? They were looking at pieces of a giant octopus!



Fat Frogs The shortheaded frog is best-known for getting fat fast. Not by eating a lot, but by blowing itself up into a big ball. When its body is puffed up, you can see how this frog got its name. The frog inflates like a balloon to defend itself against snakes, which like to swallow frogs whole. If the frog looks too big to eat in one gulp, the snake will probably leave it alone.



Tiny Bear? The water bear isn't a bear at all. It's part of the spider family. But, like a bear, it spends part of the year hibernating. When the sun dries the pond or damp moss where it lives, the water bear goes to sleep. It is so small—the size of a grain of sugar—that the sleeping bear often gets blown by the wind into nearby ponds or puddles. When the tiny animal feels the water, it wakes up.



Sea Salad? The sea cucumber is found in the ocean—not in your salad! It is a close relative of the starfish. The animal's cucumber-shaped body is divided into five parts. Like a porcupine, it is covered with spiny needles which help protect it. When an enemy is near, the prickly creature squirts gluey threads from the needles to trap the intruder. Then the sea cucumber retreats to the ocean floor.



Open Wide! Only one strand of muscle and bone control the lower jaw of the viperfish. This makes it easy for the fish to snap its jaw wide open. The force of its mouth as it opens helps the fish glide through the water. At the depth the viperfish lives—as deep as 9,000 feet (2,700 m)—the water is inky black. But the viperfish can glow in the dark. Its light attracts the smaller fish and shell fish which the viper eats.



Sleep

THE MYSTERIOUS THIRD OF YOUR LIFE

by Joan Graf

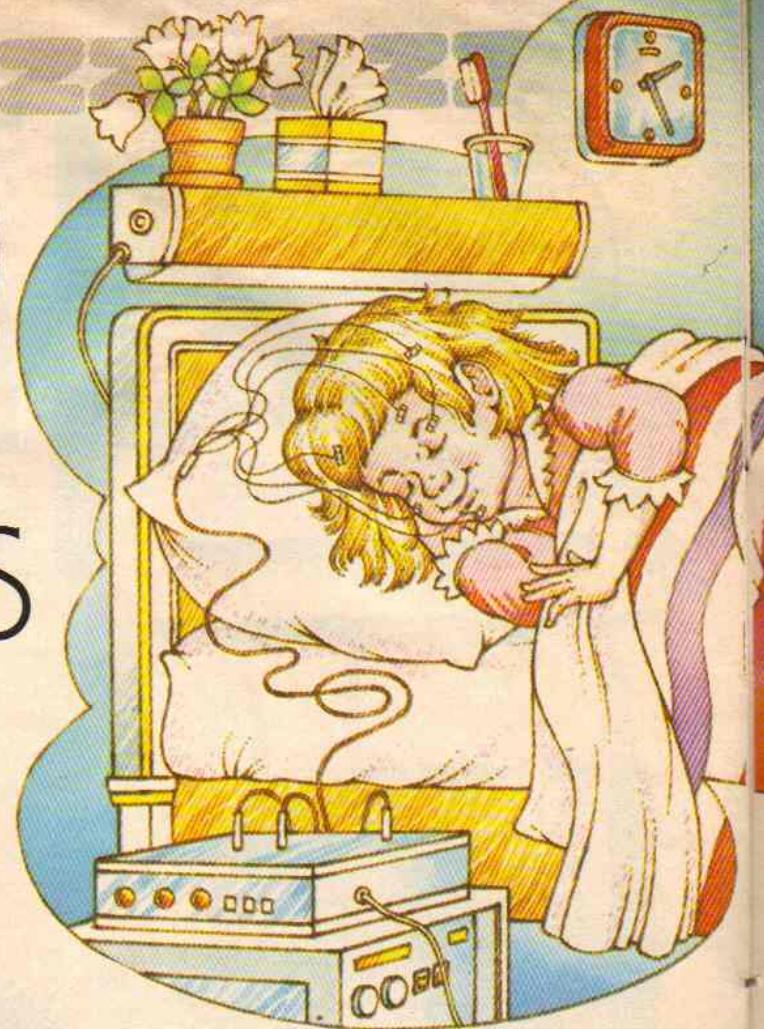
At the end of every day, you do something very mysterious. You stretch out on your bed, snuggle under the covers and close your eyes. Then, before you know it, you're asleep! Your mind seems to have gone away somewhere on vacation, leaving your body on the bed.

Like all sleeping people, you look very quiet. But inside your brain, a lot of activity is going on. Of course, you won't remember what was happening when you wake up, although you may recall some dreams. But to really understand the mystery of sleep calls for more than the memories of sleeping people. It requires careful study by scientists called sleep researchers.

Tracing Brain Waves

The study of sleeping takes place in a sleep laboratory. Its plain small rooms equipped with beds make it look very different from a regular science lab. The most important equipment is a machine called an *EEG*. (That's short for electroencephalograph!) Researchers use it to study a sleeping person's brain.

The brain doesn't make sounds. But millions of



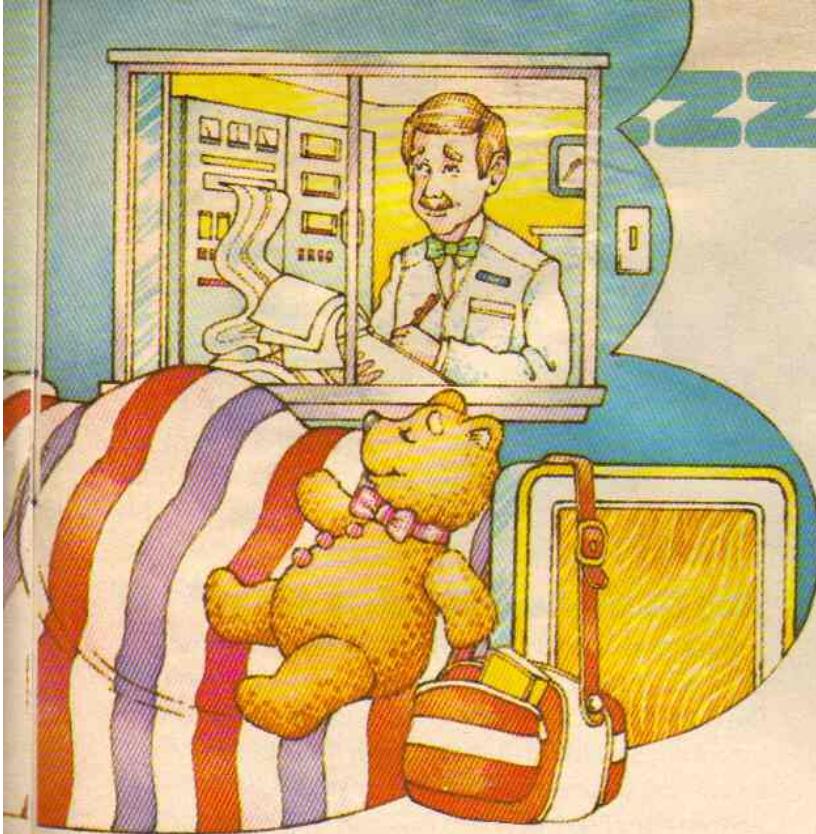
brain cells use electrical signals and special chemicals to send messages to different parts of the body. The EEG machine can measure these electrical signals or brain waves.

First, a person who is taking part in a sleep study lies down on one of the lab beds. Then she gets connected to a machine. A researcher attaches wires on the surface of her scalp, chin and forehead. Other wires go near her eyes and nose. These wires don't hurt the person in any way. At the other end of the wires is the EEG machine and other machines which measure breathing and heart beats.

The EEG is turned on. Then researchers wait for the person to fall asleep. Even before she begins to doze, the EEG picks up her brain wave signals. As it does, the machine traces a pattern of squiggly lines on a piece of paper. During the whole experiment, the machine keeps tracing. By the time the sleeper wakes up, there is a long piece of paper. It is filled with squiggles. These lines are an important clue to what was happening while that person slept.

Reading the Squiggles

Sleep experts study EEG patterns. They now



know that there are five basic brain wave patterns. Each goes along with a different stage of sleep. Everyone—including you—goes through these stages every night.

When you first start to drift off, you are in stage one. From there you go into the deeper stages. In the stage of heaviest sleep, you are completely still for 10 or 20 minutes. Then you slowly drift back through the lighter stages.

But instead of waking up, you enter into the most mysterious stage of sleep. Your eyes move quickly from side to side beneath your closed eyelids. (If you have ever watched a sleeping person for a while, you may have seen his eyeballs darting back and forth. You may have even watched this happening to your dog or cat!)

The movement gives this stage the name "rapid eye movement" sleep, or REM sleep for short. A researcher named Dr. William Dement noticed that certain brain wave patterns happen during REM sleep. They look a lot like your brain waves when

you are awake. But this stage is very different in other ways from being awake. Your eyes dart. Your hands and face may twitch a little. But the large muscles of your body are paralyzed.

Most of your dreams take place during REM sleep. Some people think your eyes dart around because you are following the action in your dreams. But no one knows for sure yet.

Scientists also don't know why we have REM sleep, but we do seem to need it. When people were kept from getting REM sleep during experiments, they became grouchy and nervous. Some of them couldn't concentrate well. And after these people were allowed to get REM sleep again, they needed more than usual for a while.

Babies spend about half their sleep time in the REM stage. This is much more than the amount of REM time that adults need. Some people think babies need more because REM sleep helps the brain to develop. ➤





The World of Dreams

You have several dreams every night. The early ones usually last only a few minutes. But the dream that you have in the early morning before you wake up can be as long as an hour. It is this dream you are most likely to remember.

Dreams can be dull or filled with wild adventure. They may be in color or black and white. Sometimes people dream they are falling or flying. Kids often dream about animals. Some people have an "exam" dream when they are worried. The dreamer suddenly discovers he must take a test—and he has forgotten to study for it. He is relieved to wake up and find he is off the hook.

Just why do people dream, anyway? There are several different explanations. A doctor named Sigmund Freud thought that dreams hide ideas that worry us. He said that troublesome thoughts would wake us if they were not disguised as something else.

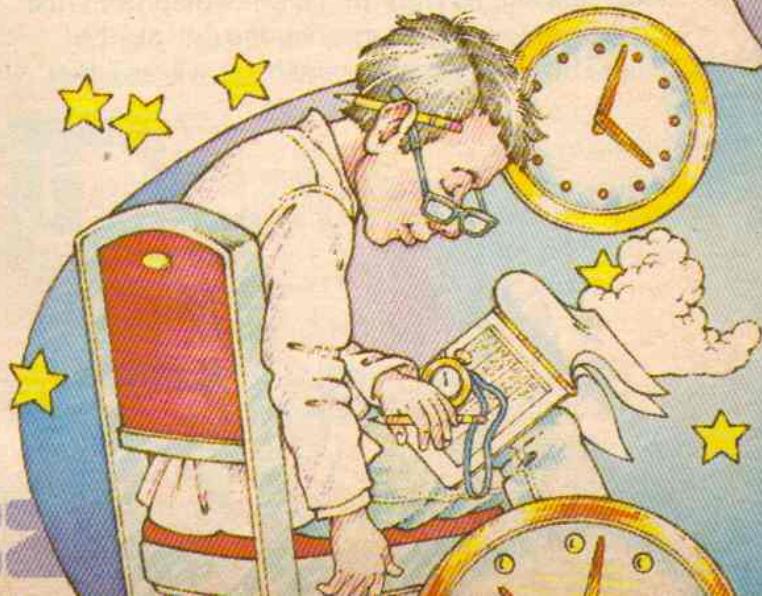
Some scientists disagree with his idea. They think that dreams are caused by the jumble of electrical signals that travel through the brain at night. They say that the brain tries to make sense of these confusing signals. For example, you may dream about being unable to move. Perhaps your brain is trying to explain the paralysis of REM sleep.

Why Do We Need Sleep?

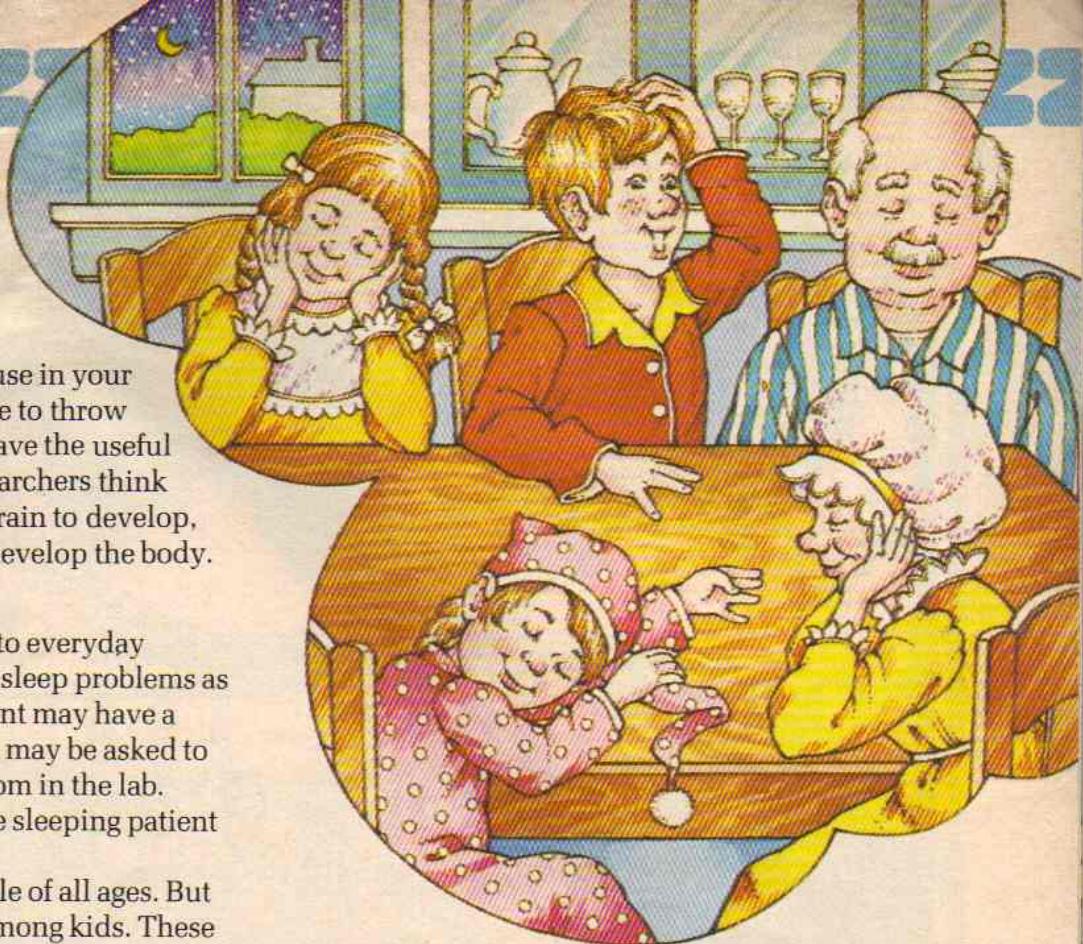
Everyone needs sleep. But how much you need depends in part on your age. Babies sleep most of the time, about 20 hours a day. Kids need 10 to 11 hours each night until they reach their teens. Most adults sleep seven or eight hours nightly. Many people over 50 need even less rest. But even for people within the same age group, some need more sleep than others do.

Some people can get by with very little sleep. A high school student named Randy Gardner set a record for staying awake as part of a science fair project. He didn't sleep for 264 hours—that's 11 days. And on the last night, he was alert enough to play 100 games on a baseball machine in a penny arcade. When Randy finally went to bed, he needed less than 15 hours to catch up. He felt fine after the experiment. But in similar experiments, other people began to see things that weren't there when they stayed awake too long.

You will probably spend about one third of your life sleeping. That time is not wasted. No one really knows for certain what sleep does for people. But there are some researchers who think that



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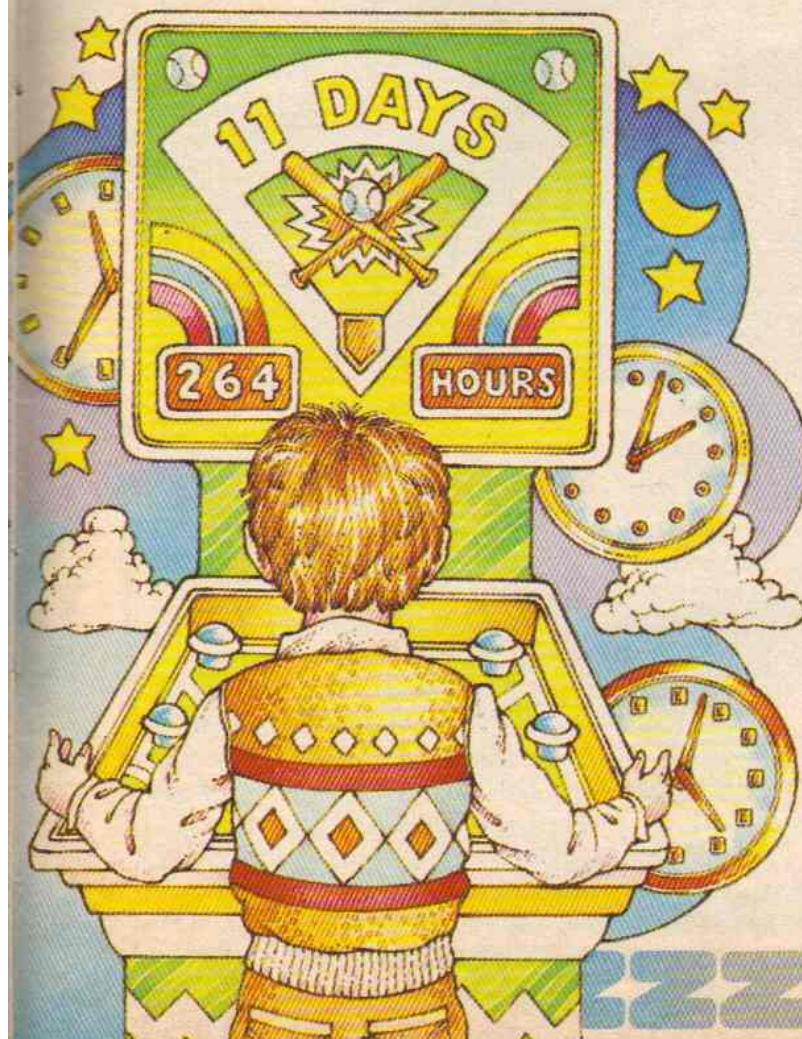


sleeping may be like cleaning house in your mind. You may use sleep as a time to throw out the junk you've learned and save the useful memories to file away. Other researchers think sleeping and dreaming help the brain to develop, just as food and exercise help to develop the body.

Troubled Sleep

The study of sleep isn't limited to everyday snoozing. Scientists study special sleep problems as well. When a doctor thinks a patient may have a certain sleep problem, that person may be asked to sleep overnight in a special bedroom in the lab. There is even a camera there so the sleeping patient can be filmed for more study later.

Sleep problems happen to people of all ages. But some of them are most common among kids. These problems include sleepwalking, night terrors and bedwetting.



People who sleepwalk are deeply asleep. The next morning, they don't remember their nighttime stroll. One sleepwalker told a researcher that everyone in his family walked in their sleep. He told a funny story about a family holiday reunion. He woke up one night in his grandfather's dining room and found himself surrounded by his sleeping relatives.

Another sleep problem that sometimes bothers kids is night terrors. The sleeper may sit up in bed and scream. His heart beats fast, and he breathes very hard. He seems frightened, but he goes back to sleep without ever completely waking up. Unlike a person who has a nightmare, he remembers nothing about the night terror the next day.

Sometimes a kid wakes up in the morning and finds he has wet his bed during the night. It might be embarrassing, but it's not his fault. Many kids wet their bed at night. Like sleepwalking, this is a problem that will go away as a kid gets older.

Tonight, as usual, you will go to bed. Once again you will enter the mysterious world of sleep. You will look like you have put your brain on standby. But, as you now know, you will be going through one of the busiest and most important parts of the day. Pleasant dreams!

Timeline



Early roller coasters had small cars and simple paths.

The History of Roller Coasters

by Barbara Seuling

Past

The "Switchback Railway" opened nearly 100 years ago at the Coney Island amusement park. It was the first American railroad built just for fun. People in its railroad car coasted a few hundred feet. At the end of the line, workers turned the car around. They pushed it over a switch and up a hill. At the top, the force of gravity did the rest. The car coasted back along another track.

The "Switchback Railway" was the idea of La Marcus Thompson. He had seen people paying to ride in coal cars in an old coal mine. Why not try the same thing at

an amusement park? Because he did, Thompson is given credit for building the first U.S. roller coaster.

Since Thompson's time, people have been improving on his design. First a machine was built to replace the workers who pushed the car. Each coaster car was attached by a series of gears to a chain underneath the tracks. The machine then pulled the car uphill. Soon, taller coasters, with extra dips, twists and turns, were built. By the 1930s, the first loop was added. Cars zoomed down a steep hill into a somersault. The speed of the coaster car created enough force to hold the upside-down riders safely in their seats. The loop helped make coasters one of the most popular amusement park rides of all.

Present

Today's roller coasters are bigger and faster than ever. Computers monitor their speed and safety. Flat metal tracks have been replaced by rails made of steel tubes. Cars with nylon wheels are more comfortable for riders. The curves are banked, or tilted, so that the cars can make smooth turns at top speeds.

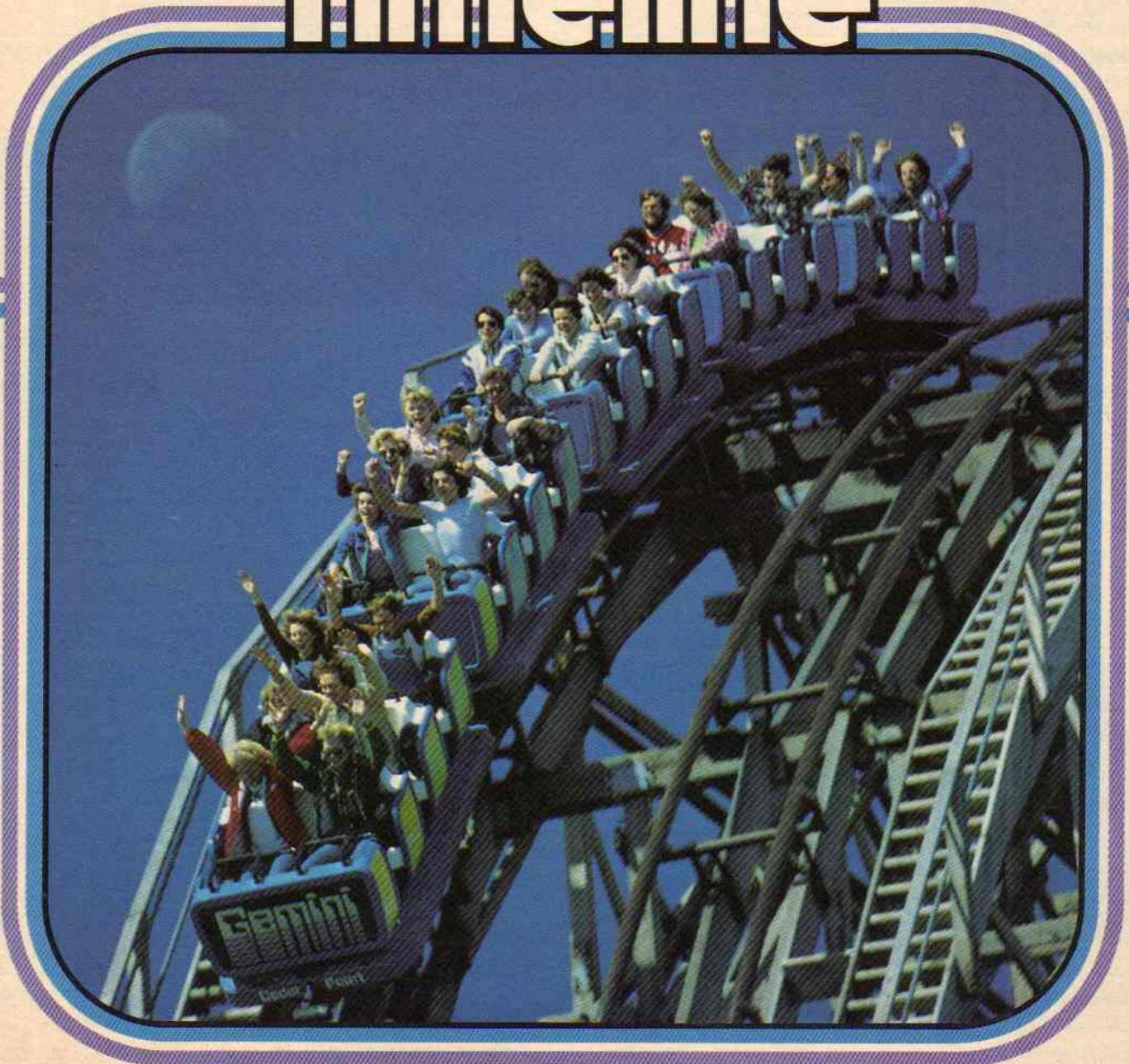
Right now the roller coaster is very popular. Dozens of new ones have been built in the last few years. They have names like *The Corkscrew*, *The Mind Bender* and *The Great American Scream Machine*. Some fans meet each year for a "Coaster Culture Conference." A Florida disc jockey likes roller coasters so much that he set a record by riding one for 168 hours. He covered a

distance of 1,946 miles (3,131 km).

One of the biggest, fastest roller coasters of all is *The American Eagle* in Gurnee, Illinois. Built in 1981, it climbs 12 stories high. Then it plunges 147 feet (44 m) into an underground tunnel at a speed of more than 60 miles (96 km) per hour. Other coasters have dazzling double and triple loops. Some swoop down through fog or total darkness. There are six roller coasters in a park in Sandusky, Ohio, that is called the "roller coaster capital of the world."

La Marcus Thompson's simple roller coaster was fun in the 1880s. But now better equipment and people's demand for new thrills have turned the modern roller coaster into an exciting Space Age ride.

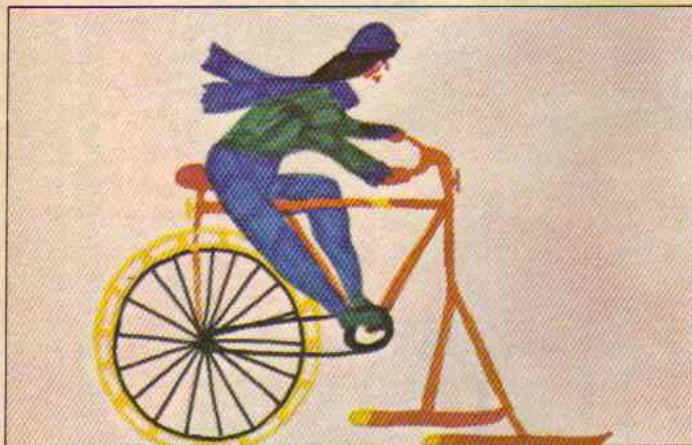
Timeline



Today's biggest coasters reach speeds of 60 miles (96 km) per hour.

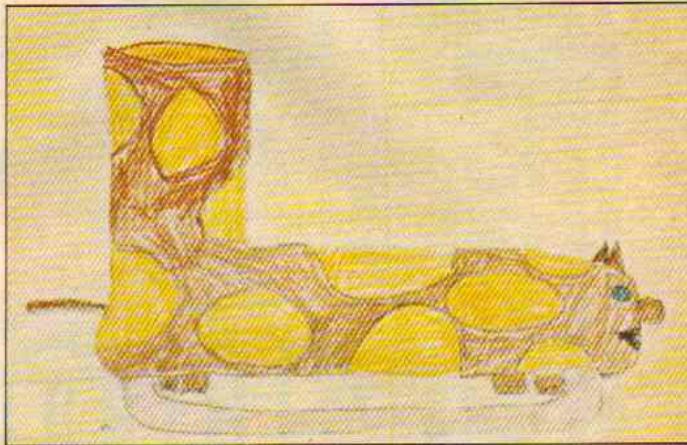
MAIL

Future Ice Skates! Thanks for sending in all those great future ice skates. Here are a few of our favorites:



Shelly Hearn, Seaford, DE.

With an Icecycle you can ride a bike and skate at the same time.



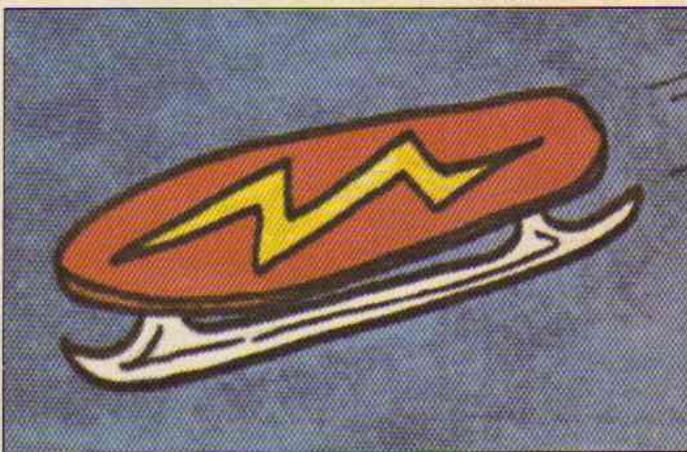
Tracy Walters, Wellesley, MA.

Hop along the ice with these Animal Controlled Skates.



Gabrielle Schneider, Plano, TX.

A windmill powers these ice skates.



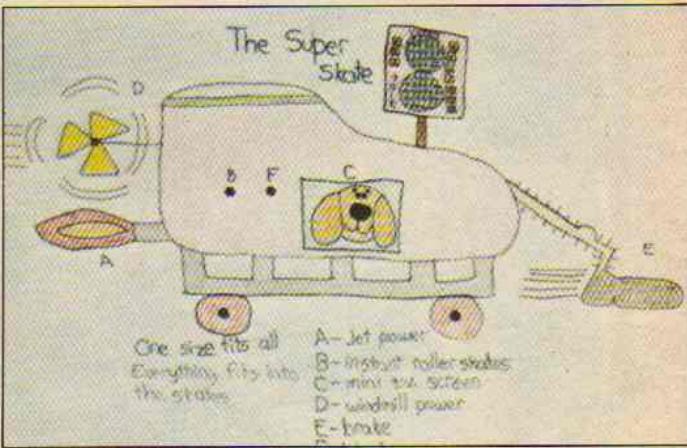
Nancy Dahl, Seattle, WA.

Zoom across the ice on this Skate Board.



Heather Kozan, Tucson, AZ.

Switch the button and turn these skates into regular shoes.



Delaine Derry, Kingsport, TN.

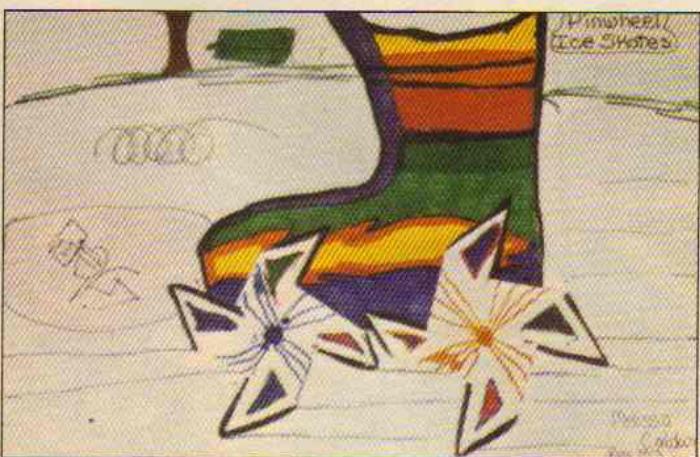
The Super Skate comes with a mini T.V. screen, phone and a brake.



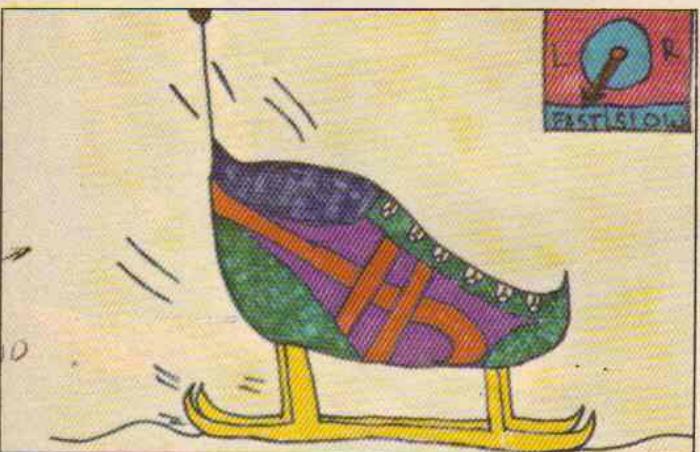
Katie Raible, Cumberland, MD.
Amazing Future Ice Skates can turn into roller skates.



Natalie Levin, Philadelphia, PA.
Have a conversation with the Talking Rainbow Face Skates.



Melissa Caldwell, Maytown, PA.
Pinwheel Ice Skates get you gliding.



Laura Reynolds, Ft. Worth, TX.
This remote-controlled skate has two blades for balancing.

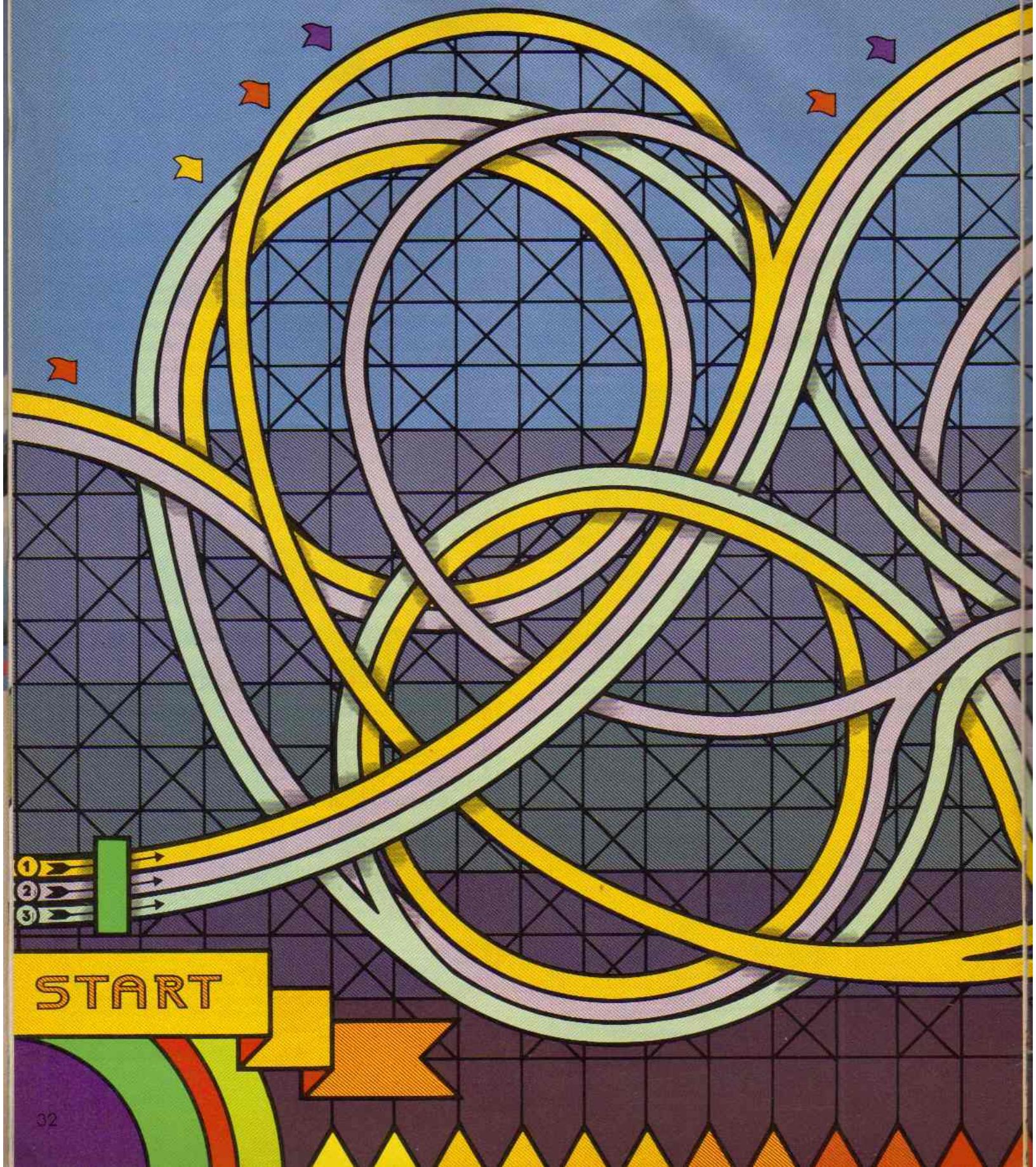
Timeline

Send Us Your Future Roller Coasters

What will the roller coasters of the future be like? Perhaps they will roar into outer space. There might be roller coasters you can ride to school. Or maybe there will be underwater roller coasters. The choice is yours. Send us your drawing for the roller coaster of the future. Tell us what it does. Don't forget to include your name, address and T-shirt size. Our favorites will get CONTACT T-shirts. Write to:

Timeline: Roller Coaster
P.O. Box 599
Ridgefield, NJ 07657

>Contact Comet

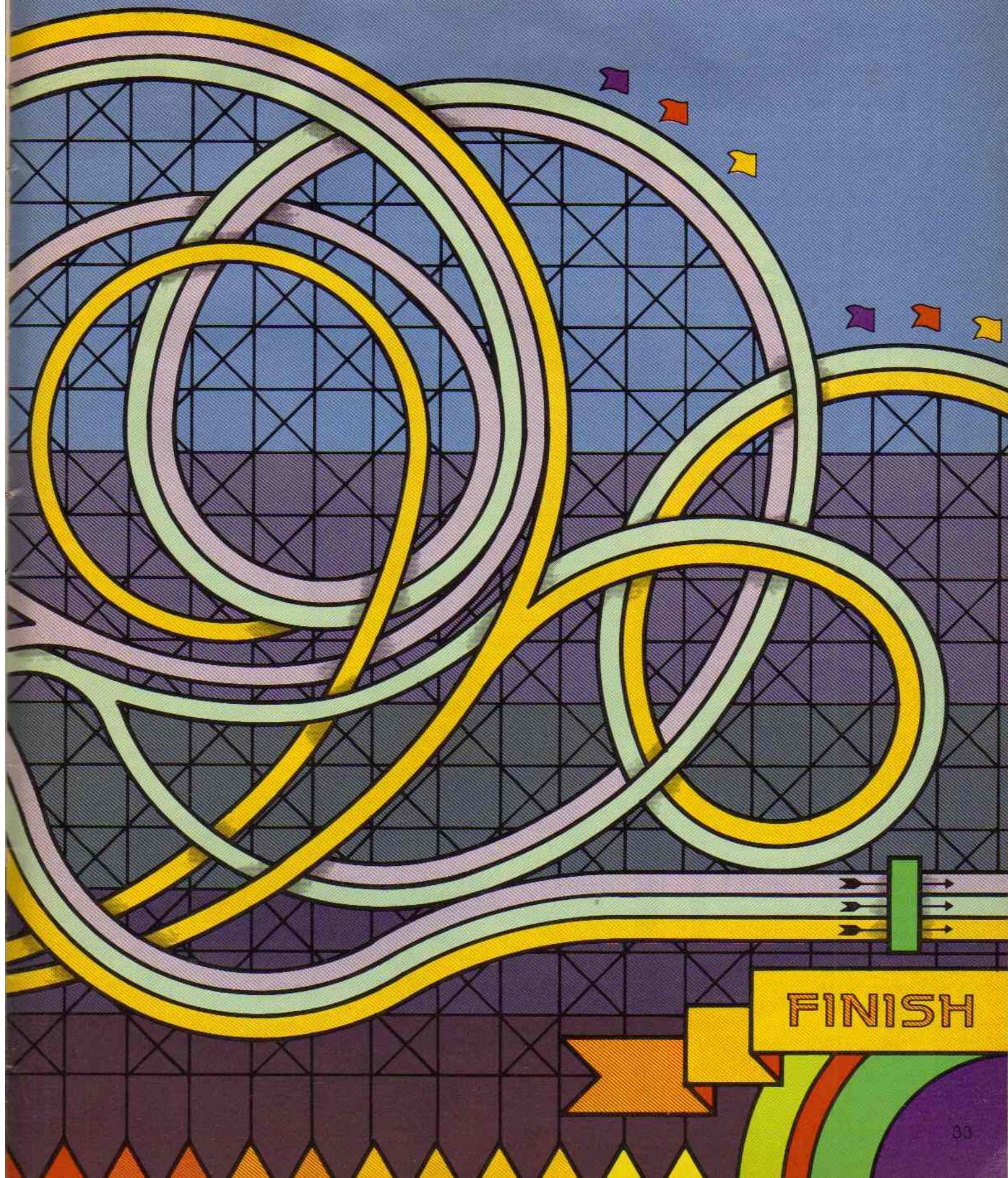


A Roller Coaster Maze

Warning! This maze is tricky! Only one path will lead you safely to finish. Begin at the numbers 1, 2, and 3. The tracks pass under each other, as if

you were traveling under a bridge. For example, you can follow the blue track as it passes under the yellow. Stay on one colored path at a time, as you try to find your way to finish.

Answer on page 37.



Reviews &

YOW!

Here are some books to read and some things to do and see after reading this issue of 3-2-1 CONTACT.

High Rollers

In Timeline you read about one of the biggest roller coasters, the 12-story-high American Eagle in Gurnee, Illinois. Want to see how it stacks up against some of the other king-size coasters? Here's a list of the world's top nine:

American Eagle	147' 10"	Gurnee, IL
Beast	141'	Cincinnati, OH
Loch Ness		Williamsburg, VA
Monster	130'	Valencia, CA
Colossus	125'	Sandusky, OH
Gemini	125'	Arlington, TX
Shockwave	116'	Mexico City, Mex.
Racer	110'	
Screamin' Eagle	110'	St. Louis, MO
The Great American Scream Machine	105'	Atlanta, GA

3-2-1 Contest

You met some strange creatures of the deep in the *List of the Month*. But with your help, we'd like to come up with one that's even stranger.

Here are clues describing an imaginary sea creature. Use them to draw its picture. There's no right or wrong drawing. Just use the description and your imagination. Our favorites will win T-shirts.

The creature:

- *Has eight eyes.
- *Has tiny, sharp teeth.
- *Has six tentacles.
- *Lives on the sea bottom.
- *Has a shell around part of its body.
- *Has a long, curly tongue to catch food.

Send your drawing, name, address and T-shirt size to:

3-2-1 Contest: Sea Creature
P.O. Box 599
Ridgefield, NJ 07657



Free Bicycle Tips

Now is the time to take out your bike for another year of riding fun. This month's safety quiz gave you some tips on how to ride safely. There's a free pamphlet that will tell you even more.

"Bicycle Safety" has informa-



tion about how to pick a bike and take care of it. There are tips for night riding and a quiz you can take on the rules of the road for bikers. For your free copy, write to:

Aetna Life & Casualty
Media Services, DA06
151 Farmington Ave.
Hartford, CT 06156

Z Z Z Z Z

On page 24 you learned about a few of the mysteries of sleep. If you would like to know more, you can find books on the subject at your library or a bookstore. Here are some to try.

Previews

Sleep and Dreams What do dreams mean? Why do people sleepwalk? Does eating certain foods before going to bed give you nightmares? What makes some people snore? These are just a few of the questions answered by Rae Lindsay in this book. It's published by Franklin Watts.

Dreams Some people say that dreams can predict the future. Others claim that dreams reveal your secret feelings. In this book, Larry Kettelkamp explains how scientists found out about the meaning of dreams. It's published by William Morrow & Company.

Is the Cat Dreaming Your Dream? Probably not, but cats, dogs, sheep, mice and monkeys dream, just like you. In this book, written for older kids, Margaret O. Hyde explains why you dream and what happens to your body when you do. The book is published by McGraw-Hill.

Museum Review

This review was sent in by Jeffrey Weinstock, Potomac, MD. The National Aquarium in Baltimore is the biggest aquarium in the country. It has four floors with over 5,000 creatures. Besides looking at fish, you can see two movies and walk through a tropical rain forest.

At one point you are encouraged to touch the creatures on display. Visitors are allowed to walk around a man-made tidal pool and touch many seashore



creatures like horseshoe crabs and sea stars.

The National Aquarium is really fantastic.

Been to a science museum lately? Why not write a review, of 100 words or less, and send it to CONTACT. If we use yours, you'll get a T-shirt. Send your review, along with your name, address and T-shirt size to:

3-2-1 CONTACT: Museum Review
P.O. Box 599
Ridgefield, NJ 07657

Spoon Chimes

The Bloodhound Gang found out that sound waves can do some amazing things.

Here's something pretty amazing you can do with sound waves — make a spoon sound like a big bell. Here's how:

1. You need a metal spoon and fork and three feet (1 m) of string.
2. Tie the spoon to the center of the string.
3. Hold the ends of the string to your ears.
4. Have a friend tap the hanging spoon with the fork. You should hear a noise like a loud bell.

When the spoon is hit, it starts to vibrate. Sound waves spread through the air and up the string to your ears.

Your friend will hear the sound the vibrating spoon makes, too. But you will hear it more loudly and clearly. The string carries the sound waves better than the air. So the ringing in your ears is extra loud.

Do It!

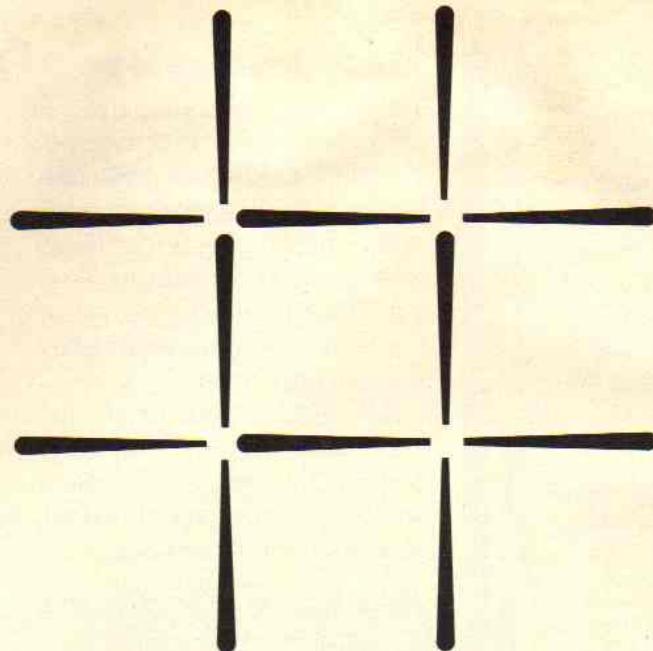
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It!

1. Toothpick Trick

Arrange 12 toothpicks as you see here. Now move 3 toothpicks to make 3 squares.

Answer on page 37.

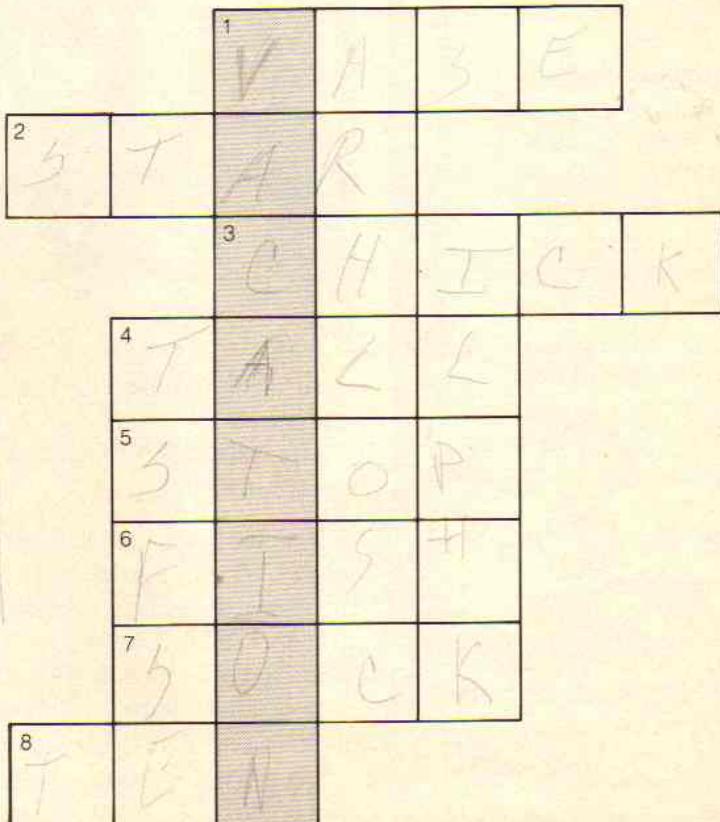


2. Puzzle

You've been waiting for it all year, and now it's just around the corner. What is it? To find out, fill in the words across. Then read the letters going down in the gray column.

1. It holds flowers
2. It twinkles in the sky
3. Baby chicken
4. Not short
5. Don't move!
6. It has fins and scales
7. It's worn inside your shoe
8. Eight, nine, _____

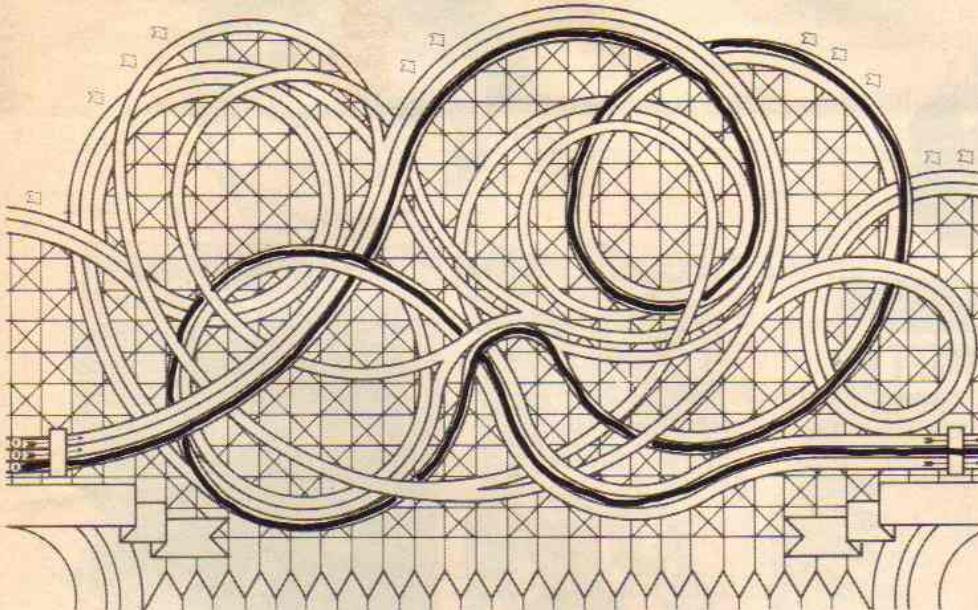
Answers on page 37.



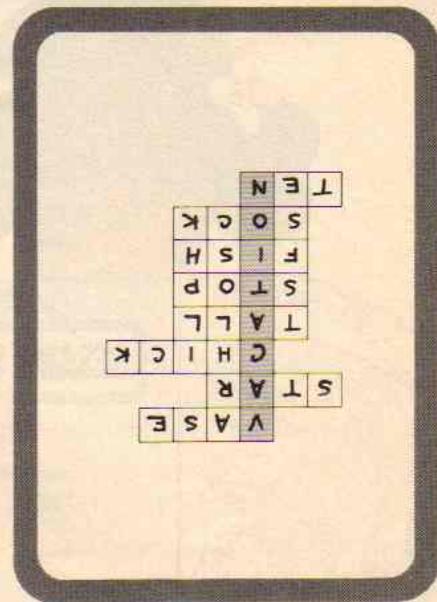
Answers

Did It! D

Maze (page 32)



Puzzle (page 36)



Thank You!

Thanks to student interns Judy Casulli, Suzanne Martinucci and Rosette Reiss for their help with this month's issue. Special thanks to Dr. Alan Kanter and Dr. Gilbert Simon for their assistance.

Next Month!

Bloodhound Gang

Next issue begins "The Case of the Flaming Feather."

Animal Pairs

Meet a bird that eats its meals inside a crocodile's mouth.

Pedal Power

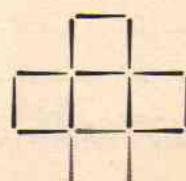
Find out what the bicycle of the future will be like.

Plus Factoids, Mail, Earth Works and Much More!

Credits

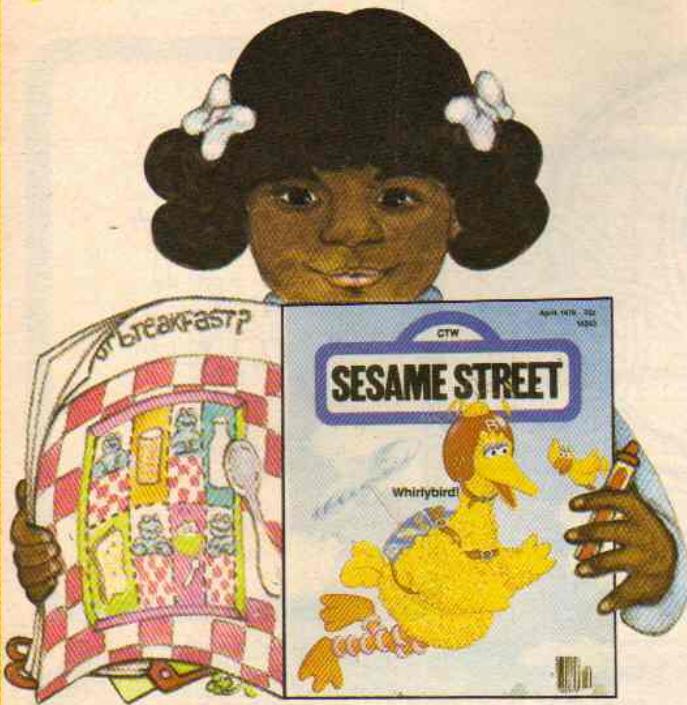
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Toothpick Trick (page 36)



Enjoy Sesame Street

For Ages 2-6



Sesame Street Magazine — Big Bird and his delightful friends will bring dozens of playful surprises, ten terrific times a year. (It's the entertaining education that Sesame Street does best!) Puzzles, cut-outs, games, A-B-C's, 1-2-3's...there's all the magic of the TV super-series in every colorful issue.

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The Electric Company Magazine — as creatively entertaining as the T.V. show kids love. It's amusing, playful, absorbing and educational for beginning and young readers.

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Earthfacts: Rainbows

by Marilou Carlin

Each month CONTACT will bring you another *Earth Works*. Save these pages in a notebook. Soon you will have your own guide to the wonders of the planet earth.

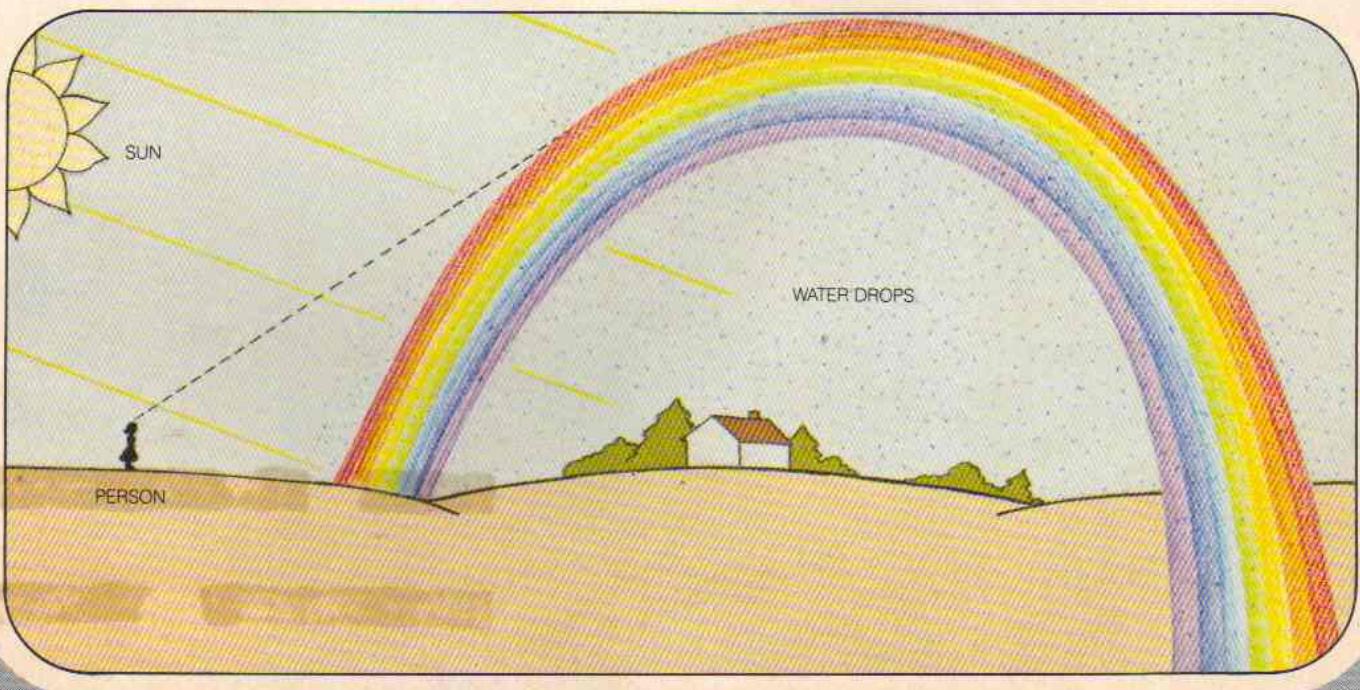
- ➊ All that's needed to make a rainbow is water and light. The water often comes from raindrops. But the moisture from fog or dew can cause rainbows, too. You can even see rainbows in the water that sprays from a garden hose.
- ➋ When a ray of light enters a drop of water, part of the light does not pass directly through. Instead, it bends slightly. This splits the light into different colors. Whenever there are enough water drops, you'll see all the rainbow colors. They are red, orange, yellow, green, blue, indigo and violet.
- ➌ A double rainbow is pretty rare. It forms when the sun's light is reflected twice before leaving a raindrop. If you're lucky enough to see one, notice that the colors in the first band start with red and end with violet. But in the second band, violet starts on the outside and red is on the inside.
- ➍ Rainbows can be near you or far in the distance. A man once saw a rainbow in front of some trees only a few yards away. But rainbows also can be miles distant. It depends on how far away the water is that forms the bow.
- ➎ The size of rainbows depends mostly on how much water is in the air. If only a small space is

EarthWorks

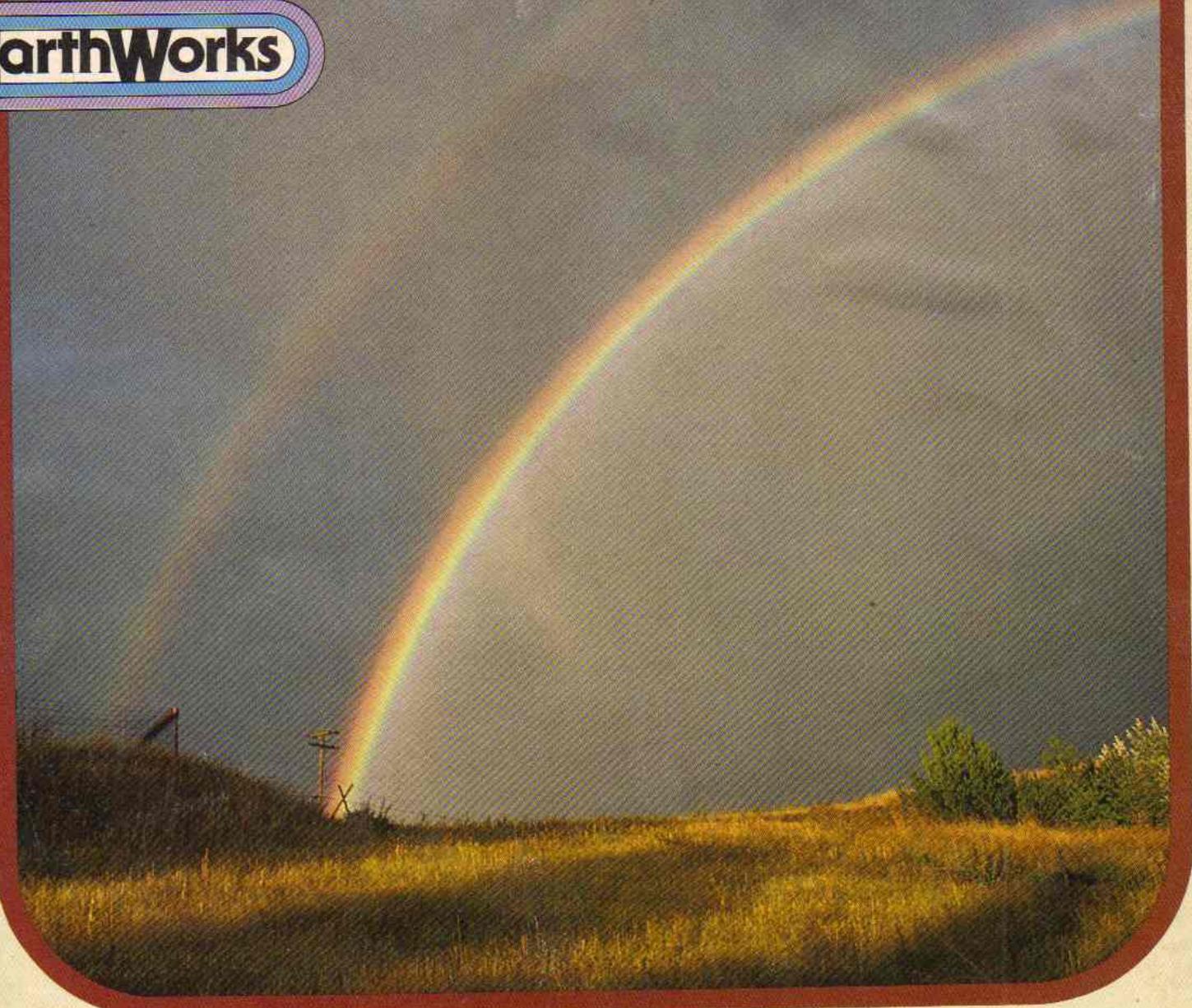
filled with water, the rainbow can't be much bigger. But miles of moisture-filled air create giant bows.

- ➏ The size of a rainbow also depends on the position of the sun. If it is close to rising or setting, the bow will be large. But when the sun is higher, you'll see less of a bow. And you'll almost never see a rainbow at noon.
- ➐ Rainbows actually form as complete circles. You only get to see part of the circle, however. The horizon cuts off the rest of the bow from view. But if you fly in an airplane and are very lucky, you might get to see the whole circle sometime.
- ➑ There are many different legends about rainbows. People in some countries believe that a pot of gold lies at the end of every rainbow. In the Far East, it was believed that rainbows were bridges. They connected the world of human beings to the world of the gods. And in other places, rainbows were thought to hold back the rain!

Below: Just like the observer, you can see a rainbow when the sun is behind you and the sky in front is filled with water. To see the bow, you must be watching from just the right angle.



EarthWorks



Rainbows

If you look quickly at this picture, you might think you are seeing double. Actually, you are. This unusual sky sight is a *double rainbow*, a rare kind of rainbow that can be seen when conditions are just right.

There are other kinds of rare rainbows you can sometimes see. Moonbows are nighttime rainbows that are found near the seashore on bright, moonlit nights. Fogbows are caused by fog instead of rain. Like moonbows, these rare bows are so pale that they are sometimes called *white rainbows*.

Of course most rainbows are brightly colored. You can find more about them on page 39.

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